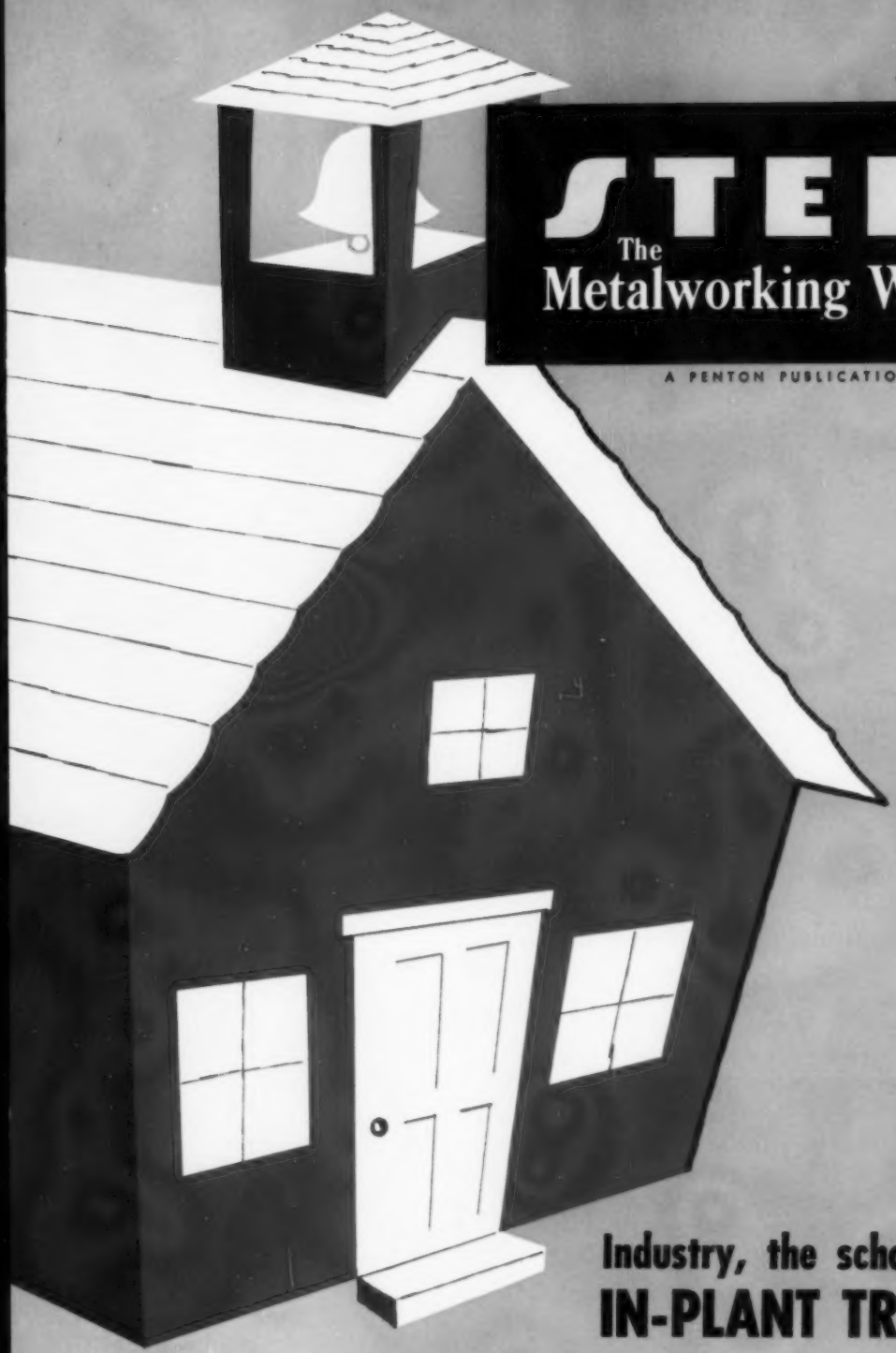
JANUARY 28, 1957

STEEL
The Metalworking Weekly

A PENTON PUBLICATION



Industry, the schoolmaster for IN-PLANT TRAINING

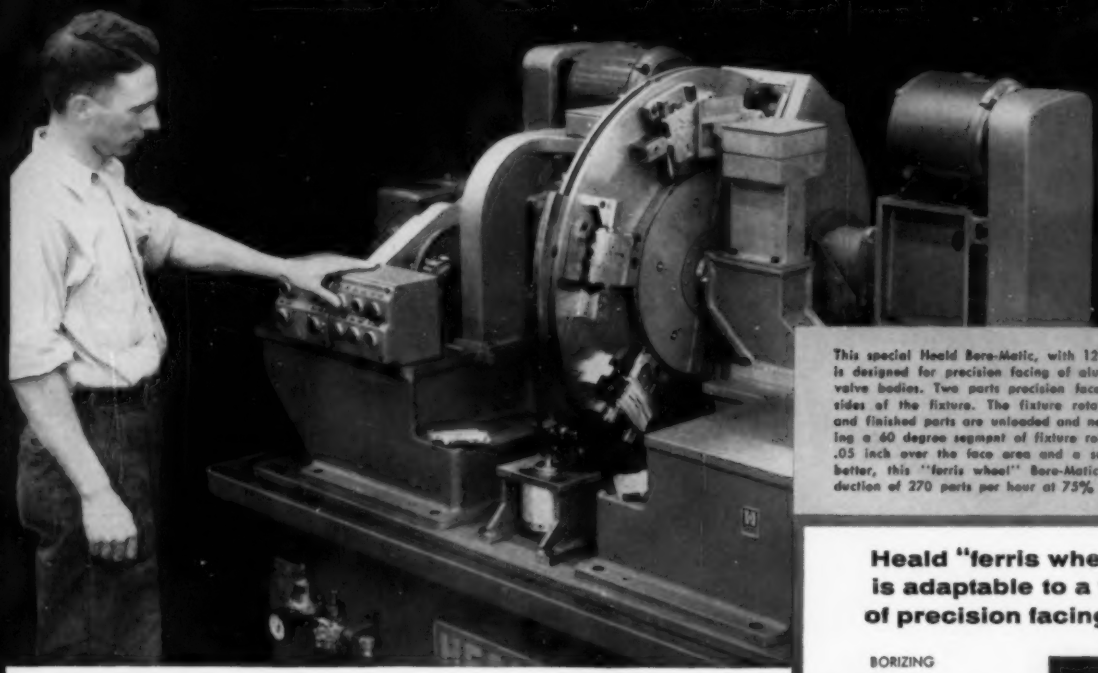
How to start and operate a program to meet the growing skilled worker shortage . . . page 68

✔ **Sintering: Race To Hold Costs —page 98**

✔ **Merchant Pig: '57 Looks Good —page 127**

CONTENTS — PAGE 5

LET'S FACE IT!



This special Heald Bore-Matic, with 12-station trunnion type fixture, is designed for precision facing of aluminum automatic transmission valve bodies. Two parts precision faced simultaneously on opposite sides of the fixture. The fixture rotates at approximately ½ rpm and finished parts are unloaded and new parts loaded manually during a 60 degree segment of fixture rotation. With stock removal of .05 inch over the face area and a surface finish of 20 micros or better, this "ferris wheel" Bore-Matic maintains a continuous production of 270 parts per hour at 75% efficiency.

Heald "Ferris Wheel" Bore-Matics put precision facing on a non-stop, high production basis . . . with loading and unloading "on the fly"

WHEN it comes to *precision facing*, Heald Borizing, with a "ferris wheel" type fixture, meets the most exacting requirements for both high production and high precision.

Designed for continuous operation, with non-stop loading and unloading, a multi-station rotating trunnion-type fixture carries the parts between two opposed boringheads which perform simultaneous facing operations on both sides of the fixture.

The loading and unloading are done while the fixture is rotating at a constant speed and can be accomplished easily by manual operation as in the photo above. A foot operated hydraulic clamping control leaves both hands free for this operation.

This specialized precision facing machine illustrates the extreme flexibility of Bore-Matic design and the ability of Heald engineering to solve your precision finishing problems with the most advanced production methods.

IT PAYS TO COME TO HEALD!

HEALD

THE HEALD MACHINE COMPANY

Subsidiary of The Cincinnati Milling Machine Co.

Worcester 6, Massachusetts

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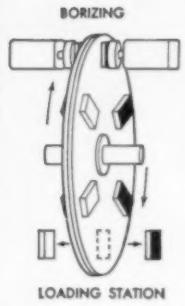
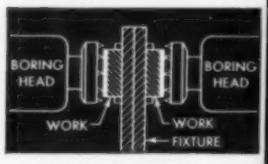
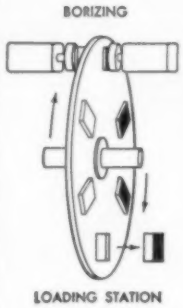
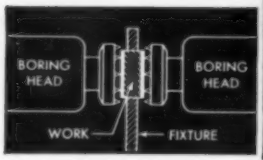
Heald "ferris wheel" Borizing is adaptable to a wide variety of precision facing operations.



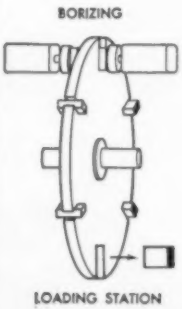


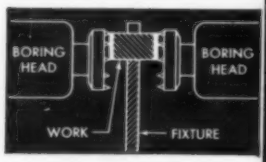
FACING ONE SIDE OF TWO PARTS SIMULTANEOUSLY





FACING BOTH SIDES OF ONE PART SIMULTANEOUSLY





FACING BOTH ENDS OF ONE PART SIMULTANEOUSLY

Something New in Piggyback

Shown here is a new semi-automatic hold-down device for securing highway trailers to flat cars in piggyback service. Developed by American Car and Foundry Division of ACF Industries in cooperation with the Pennsylvania Railroad and Rail-Trailer Company, this retractable trailer hitch moves up to brace the trailer in place, folds down flat to give clearance during loading.

ACF uses high-strength Mayari R plates to build this hitch, which is substantially stronger under impact than earlier types of braces. One man with a power tool can now secure a trailer in 2½ minutes, instead of the usual three-man crew requiring 5 minutes.

Because Mayari R has a higher yield point than carbon steels, it provides greater strength than carbon steel of the same section. Or it can be used in lighter sections to reduce deadweight. It has superior resistance to corrosion and abrasion, and good impact properties. It can be worked and welded as readily as other steels.

Catalog 353 contains detailed technical information about Mayari R, along with many interesting photographs and case histories covering a wide variety of applications. A copy will be sent you promptly upon request.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

Mayari R...High-Strength, Corrosion-Resisting Steel

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New 24-page brochure gives complete engineering data

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Elevated Temperature Drawing

*a **new** material—made by*

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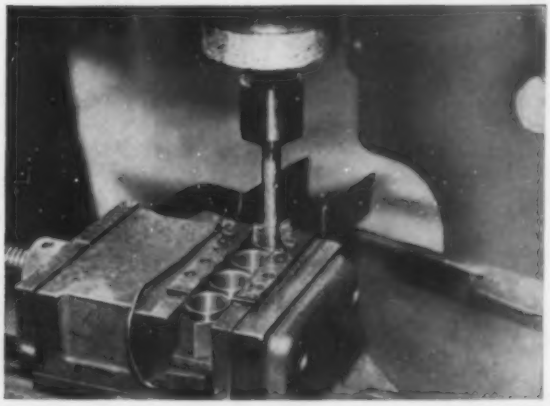
Removing chips and burrs from threads with Osborn Situfit® Brushes assures a good fit.



Before Brushing

After Brushing

Cleaning up... when the chips are down

In precision tapping, tiny abrasive chips and burrs deep down in the threads can be removed easily to assure close fit and prevent excessive wear on thread gages.

Osborn power brushing performs this operation quickly and efficiently with the simplest of equipment. Rejects, a profit-taker for any company, are cut to a minimum.

An **O**sborn **B**rushing **A**nalysis, made in your plant without obligation, may point out a number of ways Osborn power brushing can improve your metal finishing operations. For details, write *The Osborn Manufacturing Company, Department G-51, 5401 Hamilton Avenue, Cleveland 14, Ohio.*

Osborn Brushes

BRUSHING METHODS • POWER, PAINT AND MAINTENANCE BRUSHES
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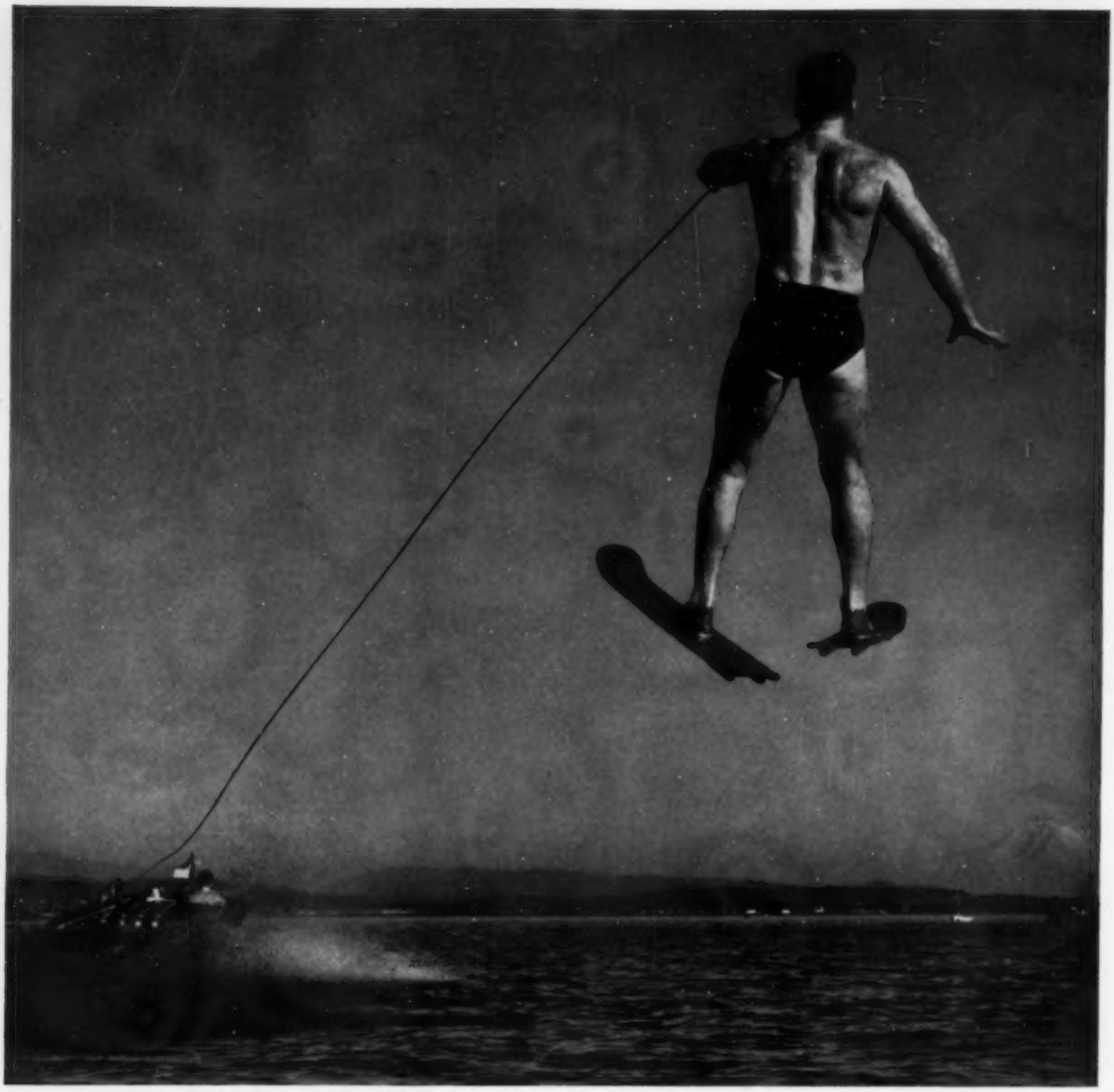
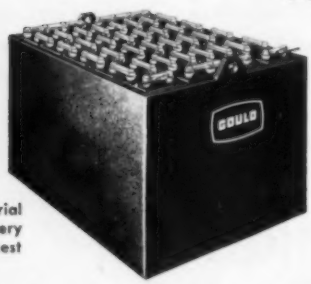


STOP... no need to be "up-in-the-air" about batteries.

Consider why other people buy Gould Batteries:



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IN THIS ISSUE

STEEL
The Metalworking Weekly

January 28, 1957
Vol. 140 No. 4

METALWORKING OUTLOOK

51 **Plant expansion** postponements get publicity, but capital outlays still will be high

57 **Labor**—Metalworkers' wage gains may average 8 cents an hour this year

58 **Highball for railroads**—Capital spending in 1957 will equal 1956's $1.3 billion. Freight car orders on books total 110,000

59 **Looking ahead**—Electric power use may be up 400 per cent by '76

60 **Piping Lake Erie to industry**—Engineers say it's needed, it's economically feasible, it can be financed

62 **Trion invites competition**—Seeks markets for electronic air cleaners

63 **Prospects bright for gas appliances**

67 **Steelmaking capacities**—Armco and Republic make biggest gains in '56

67 **Warehouse trouble spots**—Heavy plates and structurals at top of list

COVER ARTICLE

68 **In-plant training**—Helps overcome mounting skilled worker shortage

87 **Production of alloys** by vacuum melting process to get boost

TECHNICAL OUTLOOK

89 **New high temperature alloy**—Immediate use will be in jet engine combustion systems; future use seen in hypersonic planes

90 **Improving quality of flash buttwelds**—There are several ways metallurgist can help welding engineer

92 **Strain gages guard heavy presses** from eccentric overloads

94 **Elevated temperature drawing**—It improves fatigue life

95 **New cast alloy** has corrosion resistance of wrought alloys

96 **Precision paring**—Jet discs trimmed to 0.010 in. on center drive lathe

98 **Progress in Steelmaking**—Steep growth pattern for sintering plants expected to continue through 1960, then taper off sharply

105 **Magnesium**—More users being attracted by its superior machinability, high damping factor, stiffness and fatigue resistance

MARKET OUTLOOK

125 **Mills speed up deliveries**—Indexes and composites, 135; steel prices, 137; ores, 145; ferroalloys, 146; scrap trends, 148, prices, 150

127 **Merchant pig iron: Supply-demand in balance**—Seven factors will influence the market, making 1957 another good year

152 **Nonferrous Metals**—Competition becomes more intense—Prices, 154

REGULAR FEATURES

6 Behind the Scenes
10 Letters to The Editors
16 Staff Listing
23 Calendar of Meetings
55 The Editor's Views
64 Windows of Washington
72 Mirrors of Motordom
75 The Business Trend
79 Men of Industry
84 Obituaries
103 Machine Topics
111 New Products
120 New Literature
157 Advertising Index

Published every Monday by The Penton Publishing Co., Penton Bldg., Cleveland 13, O. Subscriptions in the U.S. and possessions and Canada, $10 a year; all other countries, $20. Current issues, 50 cents each. Metalworking Yearbook issue, $2. Accepted as controlled circulation publication at Cleveland. Copyright, 1957, The Penton Publishing Co.

Index available semi-annually. STEEL is also indexed by Engineering Index, 29 W. 39th St., New York 18, N. Y.

Cincinnati
Owners Report

- "processes 8 tons of parts daily"
- "120% more production"
- "tremendous time and labor saver . . . time saved, 75%; labor saved, 81%"
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What do your **part cleaning and painting** operations cost?

too much? normal? don't know?

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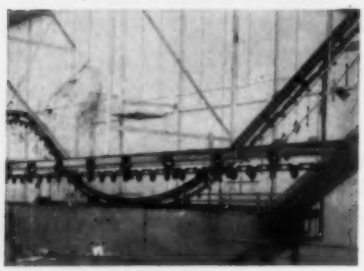


behind the scenes

Bellows for Water Pipes

The benign countenance above is that of John Byrne, executive director of the Lake Erie Watershed Conservation Foundation, Cleveland, and whirlwind advocate of those cool, cool waters for northern Ohio industries. Farther east of here, on pages 60 and 61, STEEL presents a report on Mr. Byrne's dream of piping Lake Erie water into the hinterlands. The possibilities and prospects of the project will really rock you: Business analysts declare that 96 per cent of all future plants will be built outside large cities, and all that industry ain't going to get its water from an old oaken bucket, Jack.

Mr. Byrne, a vibrant youngster of 72, has been literally shouting his way around Ohio for more than 35 years, crying for water conservation, and roaring for pipelines. He believes that ten years from today is practically tomorrow, that the world's greatest supply of fresh water will still be at Ohio's doorstep, but if the pipelines aren't in, that inexhaustible flood might just as well be in Outer Mongolia.

A survey prepared by the Stanley Engineering Co., Muscatine, Iowa, backs Mr. Byrne's recommendations, and points out that Michigan and Ontario are already working on their own water pipelines to tap the North American inland seas for industry. According to an international treaty, neither Canada nor the U.S. will pump lake water beyond the Great Lakes watershed; in this way, all water taken out will flow back again, and nothing will happen, except that perhaps the lakes might grow a little dirtier—but so long as we have chlorine, who cares?

Addenda, Plus Muriel

Odds and ends in our ragged files reveal that a truck driver, Esuro Sano, of Fuji City, Japan, stole 68 manhole covers, 50 fire bells and numerous steel rails along his 60-mile route. He said he was in the scrap business. And a squib from the Department of the Interior boasts that on Jan. 14 the department published a ginger peachy geological survey bulletin containing an annotated bibliography of published reports describing places in Alaska where scientists have collected fossils of the Paleozoic period. An evaluation is made of age determinations based on these fossils. The author has attempted to show which data are (you're in the solid scholastic league when you say "data are") adequate to date the rocks, and which need re-examination and revision. Altogether an exciting publication. You won't want this one to get away from you. Finally, the U.S. Bureau of the Census lets it slip that the total number of horses and mules on American farms has dwindled to 4.1 million, and frankly, we don't know what to do with the information.

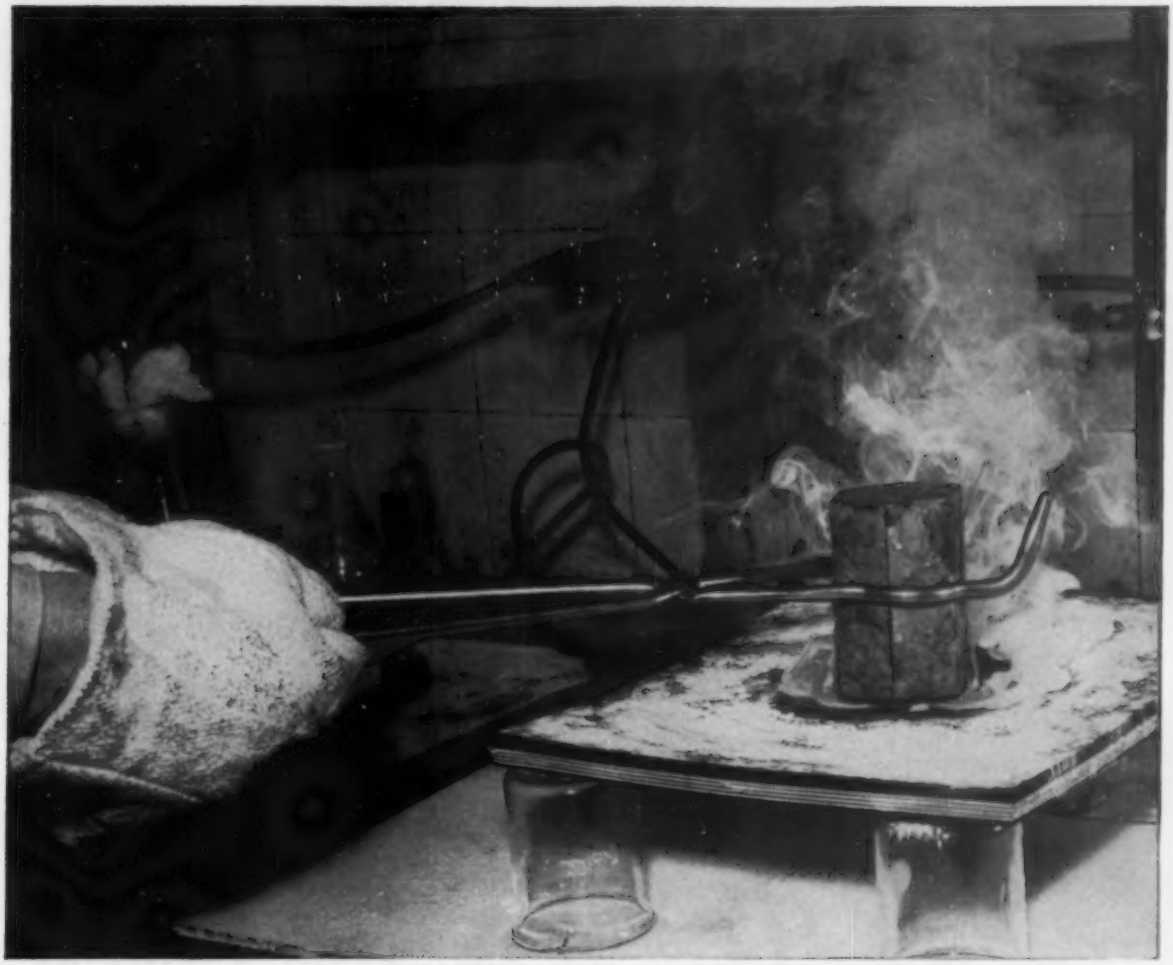
Messrs. R. W. Ohmeyer, White Plains, N. Y., and C. Leonard Forbes, Denver, confessed a liking for our silly puzzles, so here's one cooked to serve. Muriel, a carpet beetle who always ate her way diagonally, was also a bug at figures. However, she always transposed her ciphers, so her sums naturally looked cockeyed. For instance, after completing her first corner-to-corner trip through a delectable Axminster, she figured the diagonal distance. "This rug is 38 x 65 in.," she muttered. "Therefore, $38^2 = 858$, and $65^2 = 324$. $858 + 324 = 481$, and $\sqrt{481} = 06.7899$."

How far did Muriel travel?

Shrdlu

(Metalworking Outlook—Page 51)

B.F.Goodrich



Red-hot metal won't burn through this B.F.Goodrich conveyor belt

New fire curtain means longer life for hot-material belts

SCORCHING chunks of metal that sometimes land on foundry conveyor belts won't burn holes through a B. F. Goodrich conveyor belt with the built-in fire curtain.

This new protective shield is two layers of glass fabric that B. F. Goodrich puts into the top cover of hot-material conveyor belts. If a hot chunk of metal accidentally drops on the belt, the rubber cover chars at the spot, but only down to the glass fabric fire curtain. Since the hot object doesn't penetrate the glass fabric barrier, the belt keeps its strength and so, of course, lasts longer than belts without this protection.

To demonstrate the effectiveness of the fire curtain, tests were run on two hot-material belts. One belt had the B. F. Goodrich fire curtain protection; the other did not. A red-hot steel bar was placed on each belt. It burned through the rubber covers on both belts. And it burned a hole clear through the unprotected belt. But the B. F. Goodrich fire curtain stopped the burning chunk, so that the body of the protected belt was undamaged.

The fire curtain protection is ideal for foundry service where burnt holes are the major cause of short belt life. It can be built into any B. F. Goodrich hot-material belt. Talk it over with a B. F. Goodrich distributor and see if this new belting improvement is the answer to your hot material problems. *B. F. Goodrich Industrial Products Company, Dept. M-846, Akron 18, Ohio.*

B.F.Goodrich

INDUSTRIAL PRODUCTS

Mr. T. R. Heyer, V. P., The Heyer Corporation, Chicago, Illinois

Look at our figures on "Automatic" Sprinkler Fire Protection...says the Heyer Corporation

Annual Insurance Cost—without Sprinklers	$ 9,112.96
Annual Insurance Cost with "Automatic" Sprinklers	986.00
TOTAL ANNUAL INSURANCE SAVINGS	**$ 8,126.96**
Cost of "Automatic" Sprinkler Installation (to be paid over a 5-year period)	$20,965.00
Cost of Installing Central Station Supervision Service	2,572.56
TOTAL INSTALLATION COST	**$23,537.56**
Annual Rental—Central Station Supervision Service	$ 756.00
Net Insurance Savings—1st year	$ 605.40
Projected Net Annual Insurance Savings—2nd to 5th year	4,689.96
NET PROJECTED INSURANCE SAVINGS—1st 5 years	**$19,365.24**
Projected Net Annual Insurance Savings—2nd 5 years	$ 7,370.96
PROJECTED NET INSURANCE SAVINGS—2nd 5 years	**$36,854.80**
PROJECTED NET INSURANCE SAVINGS—1st 10 years	**$56,220.00**

"In addition, because of our Central Station Supervision Service, which the "Automatic" Sprinkler System made possible, we are making an annual savings of $4238.36 in cost of Watchman Service. And, of course, we have the safeguard of complete fire protection for our plant—extremely important for business continuity—since many of the materials used are highly flammable and a serious fire would be disastrous."

WANT MORE FACTS? Send for our Bulletin No. 66 "The ABC of Fire Protection" which tells you how "Automatic" Sprinkler Fire Protection can protect your plant—while reducing your insurance premiums and returning a profit.

"Automatic" Sprinkler

"AUTOMATIC" SPRINKLER CORPORATION OF AMERICA

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50 lbs. oil pressure

IS NECESSARY WITH A CUT LIKE THIS...

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It also demonstrates the strength, rigidity and power which are standard features on all Cincinnati Rigid Shapers.

Demonstration cut on Cincinnati Rigid Shaper. Actual size steel chip, 2" cut, .030" feed.

50 p.s.i. system includes 50 micro filter, settling basin and reservoir. Transmission runs submerged in oil.

• *Write* ***Department C*** *for Bulletin* **"Cincinnati Rigid Shapers"**

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Move fast against fire the instant it strikes, and you can stop it with little damage. But let it get a head start, and you may lose equipment, buildings . . . or your life.

Be selective in your choice of fire extinguishing equipment. Choose Kidde! You can be certain of rugged construction, simple operation, and absolute dependability.

For more than thirty years, Kidde fire extinguishers have been built to the most exacting specifications, have passed the most rigorous of tests, have the highest ratings. There is not a better-made extinguisher on the market today.

In ease of operation Kidde extinguishers also stand unsurpassed. The trigger-release grip on Kidde carbon dioxide and dry chemical extinguishers is the fastest and most natural to use. With it, even inexperienced operators can move swiftly and confidently against a blaze, extinguishing flames in seconds. You simply aim the horn, pull the trigger, and fire's out. Models with squeeze valves available too.

Finally, there is the Kidde service organization. In cities everywhere there are trained Kidde representatives who are ready to service your extinguishers.

For more information about the line of Kidde extinguishers, write for Kidde's P-8 Catalog.

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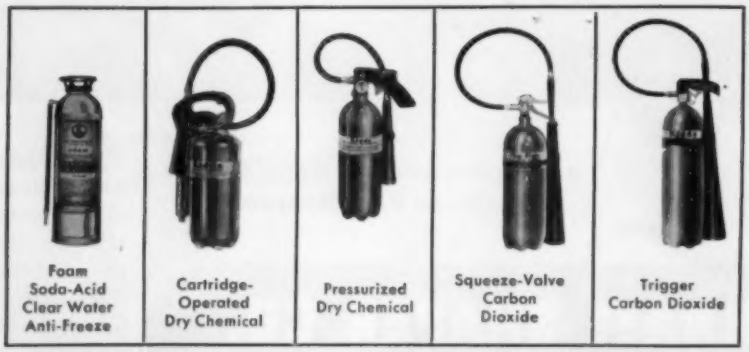


Be sure to see the complete line of **Kidde Portables** at **Booth No. 1347**, at the **Eighth Plant Maintenance Show**, January 28-31, 1957, Cleveland, Ohio.

LETTERS
TO THE EDITORS

Cover To Dress Up Exhibit

You are to be complimented on having published an attractive and informative 1957 Metalworking Yearbook and Planning Guide (Jan. 7). I found much of interest in the comments of metalworking people in the Forum on Technical Progress (page 217).

We plan to use the Forum in preparing our exhibit for our annual meeting next fall and could use a copy of the cover to dress things up a bit.

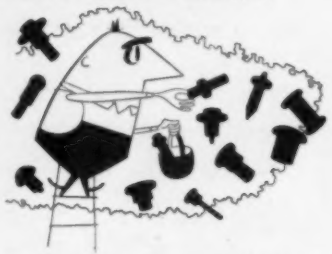
R. C. Sollenberger
Executive Vice President
Conveyor Equipment Manufacturers Association
Washington

Helpful, Brief Statement

Your article, "Steel Expansions Go Ahead" (Jan. 14, page 37), is a helpful brief statement of the expansion plans of the steel industry.

Ben Moreell
Chairman
Jones & Laughlin Steel Corp.
Pittsburgh

Article Echoes Philosophy



We think the article, "Cold Heading Branches Out" (Jan. 14, page 71), is excellent. Much of it echoes our own philosophy as we would write it ourselves. We would like 100 copies to send to our salesmen.

Our thanks, again (even though you did leave an "l" out of Hassall in the caption on page 73).

John D. Brewer
Advertising Manager
John Hassall Inc.
Westbury, N.Y.

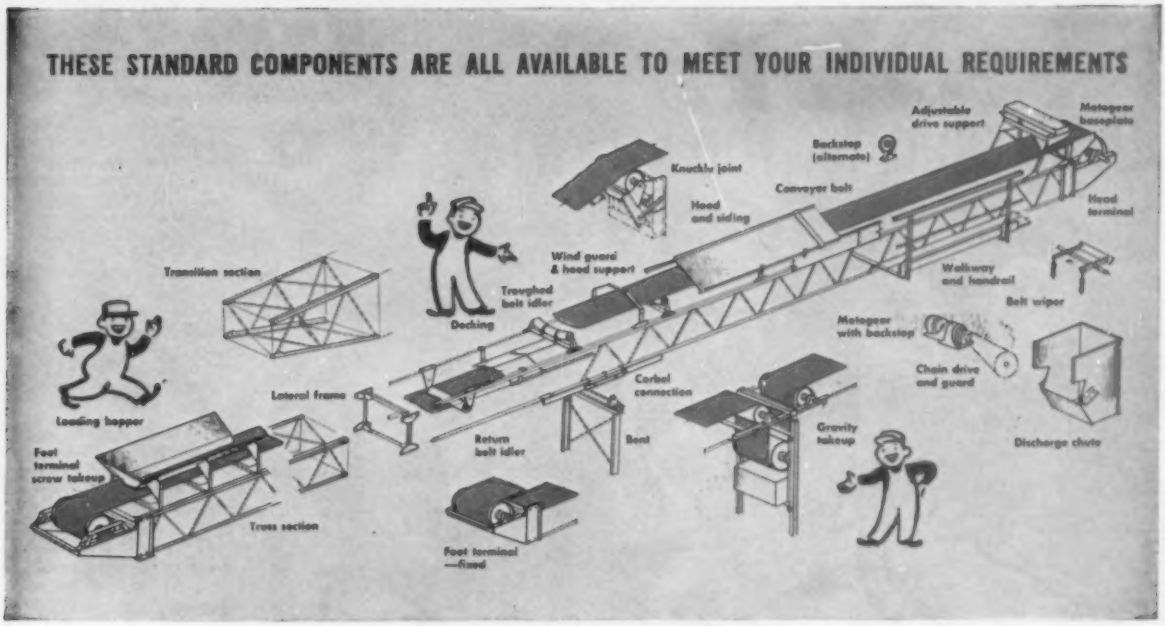
Steel Shortage Hurts Shipyards

I have been a reader of the Metalworking Outlook column for many years and have used the information with some degree of success as a guide to steel inventories. However, your second item in the Outlook of Nov. 26 (page 51) states there is no gray market in steel yet.

If you think this is true, try to buy wide plates, angles, channels and wide flange beams. During 1956, we purchased 1442 tons of this material at the best prices we could get. The average cost delivered in our yard was 9.908 cents per pound. We also purchased 1451 tons from mill sources—all we could get—at an average delivered price of 6.134 cents a pound. A good portion of this was conversion tonnage costing $19 a ton more than regular mill prices.

For your information, small shipyards such as ours are being hurt badly by

(Please turn to page 12)



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Here's an economical, standardized belt conveyor "package" . . . ready to meet the majority of belt conveyor needs and perform dependably for years and years. It combines standard Link-Belt products with sectional truss frames and steel supporting bents.

Book 2579 has further data on Link-Belt PRE-BILT conveyors . . . with drives up to 40 hp and 24 and 42-inch truss depths. Write today, or ask for a copy at your nearest Link-Belt office.

easy selection

Your Link-Belt representative will help you select the best combination of PRE-BILT sectional belt conveyor components.

LINK-BELT

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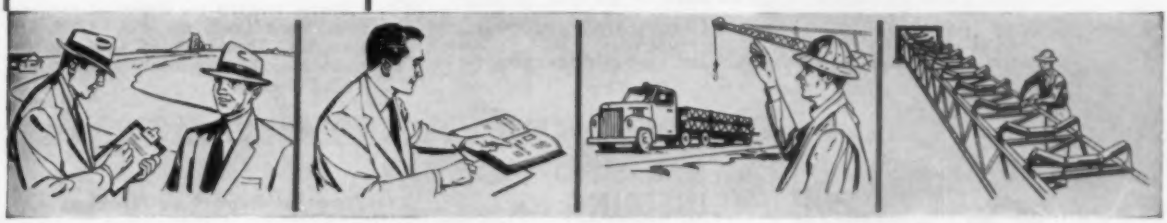

prompt quotations

He will prepare a comprehensive and accurate estimate of requirements for installations that permit "on-the-ground" survey.

simplified purchase

Parts are standardized, interchangeable, all available from one supplier. Link-Belt representative can furnish all data.

quick delivery

PRE-BILT conveyors are built at nine strategic locations throughout the country and are shipped from the plant nearest you.

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Can be readily handled by your own erectors in most cases. Link-Belt can also furnish complete erection service and supervision.

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World.

Don't wait for the straw!...

Call Pioneer now...

Why worry about where to find competent designers and engineers of dies, fixtures, tools and gages.

Pioneer has them for you.

Our highly skilled tool designers and engineers are the permanent solution to engineering overloads in many tool and process engineering departments like your own.

They will be ready to go to work *when and as you need them.* Eliminate worry about temporary overloads and excessive payrolls. Call Pioneer headquarters now.

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INDUSTRIAL ENGINEERS, CONSULTANTS & DESIGNERS
BRANCH OFFICES IN DAYTON, OHIO, WASHINGTON, D. C. and TORONTO, ONT., CAN.

LETTERS

(Concluded from page 10)

the present shortage—and the worst part of it is that the smaller mills are selling their production at premium prices to brokers and warehouses in the Philadelphia, Chicago and Detroit areas instead of to legitimate accounts. By the time we get it, the cost is 11 or 12 cents.

This practice is hurting the economy of the nation. I believe it would help for your magazine to let it be known that these conditions exist.

E. W. McCarthy
President
Gulfport Shipbuilding Corp.
Port Arthur, Tex.

• *One concept of a gray market is the movement of substantial tonnages at above mill or warehouse prices. To our knowledge, the movement at these high levels has been small and sporadic. If you know of other companies which have experienced your problems, we would like to know who they are.*

Fine Job on Survey

You have done a fine job on your annual survey, "What Metalworking Management Expects in 1957" (Jan. 7, page 127). I am interested in receiving three copies.

H. E. White
President
Cleveland Hardware & Forging Co.
Cleveland

Well-Defined Marketing Concept

Will you send us two reprints of the article, "Bigger Jobs for Marketing" (Dec. 24, page 38). While we follow the concept outlined, we have never seen it so well defined before.

W. R. Lockridge
Director, Marketing
New York Air Brake Co.
New York

Article Helps Engineers

We are much concerned and interested in your article, "Soldering Keeps Up to Date" (Dec. 17, page 86). I would appreciate five copies, since this information will be helpful to our engineers.

R. J. Poux
Project Engineer
Talon Inc.
Meadville, Pa.

World Steel Production

Please forward six copies of the article, "Steel Leads the Way" (Dec. 31, page 38). These will be used by the students of the Industrial College of the Armed Forces.

C. E. Mott
Captain, USN
Instructor, Economic Potential Branch
Industrial College of the Armed Forces
Washington

Progress Report on Titanium

In your Dec. 10 issue, there appeared the article, "We're Ready for Volume Business, Say Extruders of Titanium" (page 142). We would like 25 reprints of this excellent article.

T. A. Miller
Advertising Manager
Latrobe Steel Co.
Latrobe, Pa.

There's nothing more versatile than a spring

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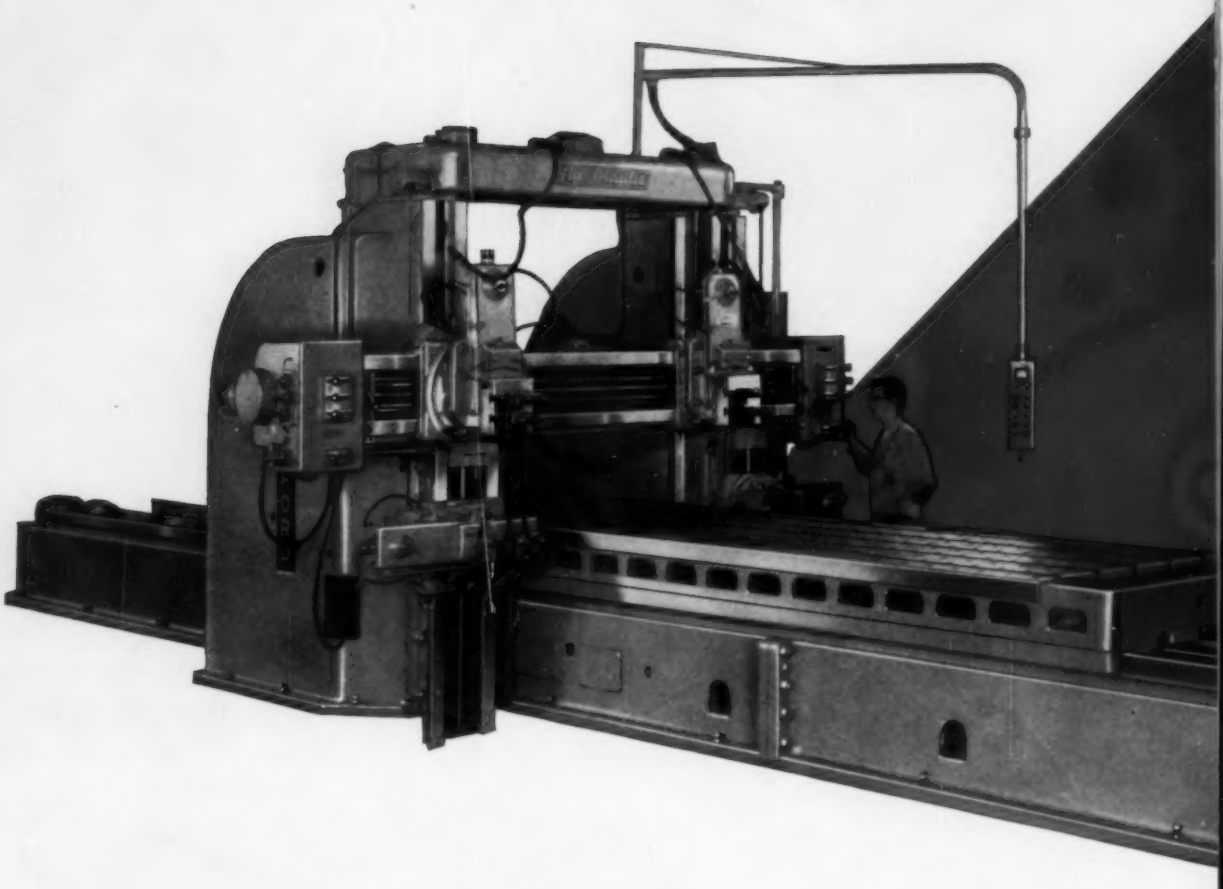
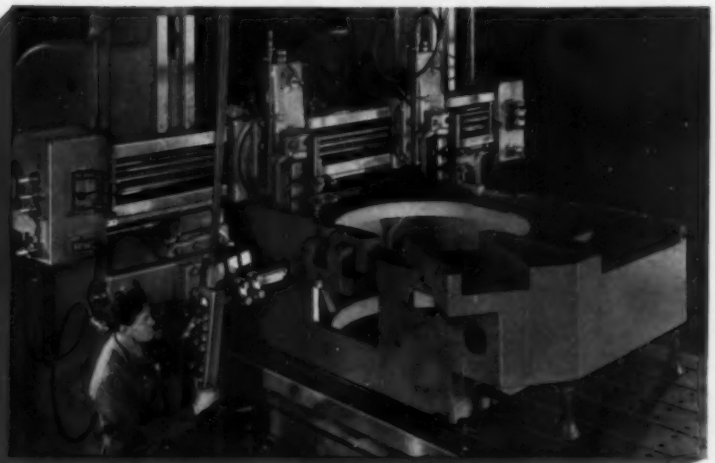
versatility of triple circuit h3 drive



shown with 4-TON work piece!



MACHINED ON DOUBLE-HOUSING

ROCKFORD HYDRAULIC PLANER

A Rockford Double-Housing Hydraulic Planer machines this huge casting, using carbide tools on 2 railheads and 1 sidehead. The exclusive hydraulic triple circuit supplies 3 cutting speed ranges for flexibility in changing from one kind of work to another. Pendant control offers selection of low range to 100 fpm., for extreme depths of cut and maximum feeds; medium range to 150 fpm., for average cuts in medium steel or cast-iron; or high range to 300 fpm., for carbide planing of steel and non-ferrous metals.

It is possible for an operator to adjust the h3 drive from 10 to 300 fpm. at the normal operating position, instantly selecting the speed range ideally suited for his individual job application.

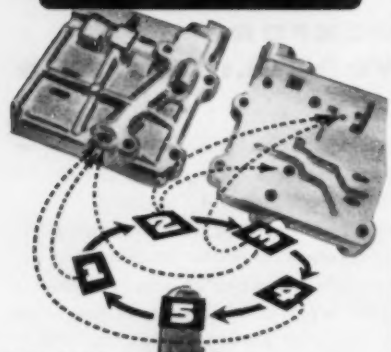
See your Rockford Machine Tool Company representative for complete information on the versatility of the new hydraulic triple circuit h3 drive for your production work.

ROCKFORD MACHINE TOOL CO.

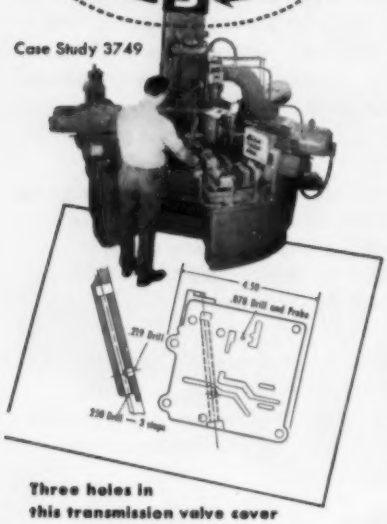
2500 KISHWAUKEE STREET • ROCKFORD, ILLINOIS

drilled and probed automatically in one chucking on a

KINGSBURY



Case Study 3749



Three holes in this transmission valve cover
. . . 5 operations
. . . 350 parts per hour gross

The machine drills three holes in this aluminum die casting. The customer asked us to probe the tiny .078 hole as the best means of inspection. An air-actuated mechanical probe operates at the next station after this drilling. If the hole is not drilled, the probe trips a limit switch which stops the machine.

We pioneered in these indexing automatics and we still think we can build them better than anyone else. They will produce to your specifications. If you have critical high production drilling and tapping jobs, we'd like a chance to show you what we can do. Kingsbury Machine Tool Corporation, Keene, N. H.

KINGSBURY
INDEXING AUTOMATICS
for high production drilling and tapping

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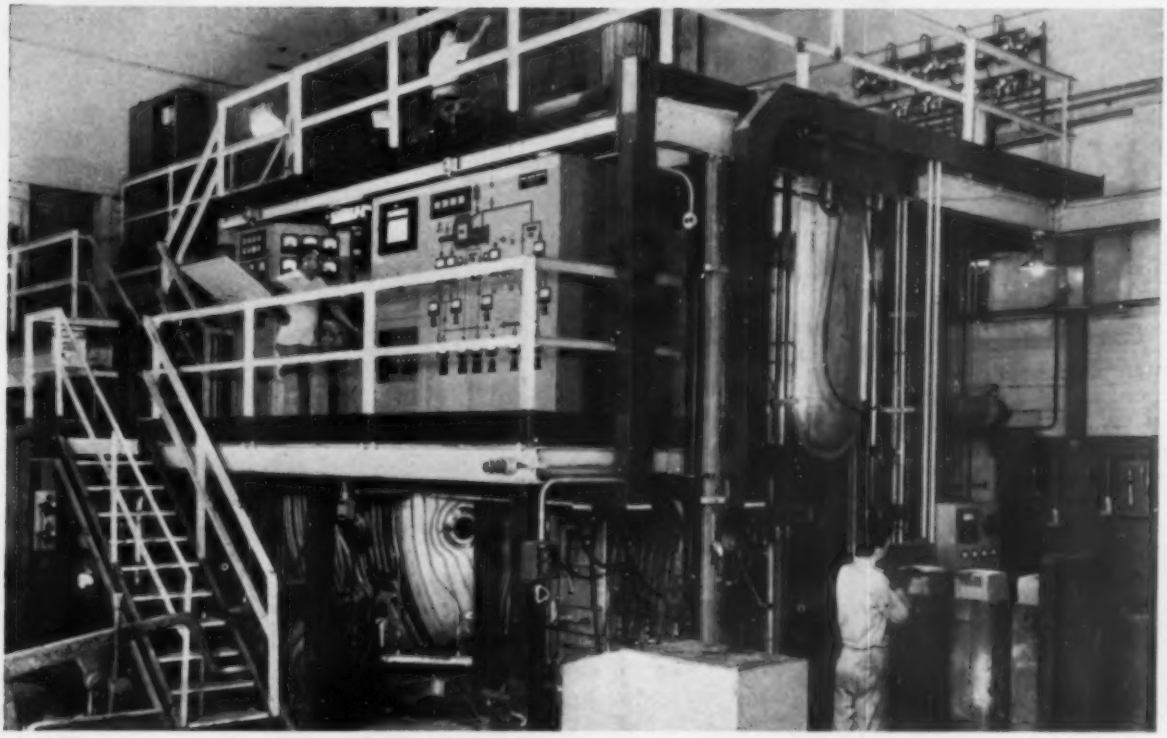
At Last! Proof That Vacuum Furnaces Have Grown Up



Two miles of wire and one-half mile of copper tubing were used in the construction of this vacuum furnace by National Research Corporation for Vacuum Metals Corporation, Syracuse, New York. Equipped with air locks and hydraulic controls, it permits casting and removing 3000 pound ingots without breaking vacuum. "Watch-dog" timers and interlocks guard against operator error and make the operation of this furnace almost automatic.

Facts About the Triumphant Performance of
The World's Largest High Vacuum Induction Furnace

This NRC unit, built for Vacuum Metals Corporation, set a new standard of performance for large high vacuum furnaces. Not only is it the world's largest and most automatic vacuum induction furnace, but it successfully produced a 2200 pound ingot *on the very first try*. It is today making melts up to 3000 pounds in a wide variety of alloys and ingot combinations.

From their own sad experience many vacuum melters agree that it is unusual for *any* vacuum furnace to perform properly, right from the start. It is unheard of for a "first-of-its-kind" furnace of such size and complexity. Among its pioneering features are operation of the induction coil at 800 volts, coaxial power leads, provision for flooding with argon in less than 11 seconds, pictorial control panel, and joy-stick controls.

You can expect completely satisfactory performance like this from any NRC vacuum furnace — large or small — induction, arc, or resistance. From the 4 pound NRC Model 2904B to production-sized furnaces, they all will give you maximum results with a minimum expenditure of man hours. That's because of what we've learned from building and operating more high vacuum furnaces than any other organization in the world. Send coupon below for more information.

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FIVE ENTHUSIASTIC ENGINEERS
To Help Us Keep Growing.

Mechanical, electrical and chemical engineers who honestly enjoy solving novel problems in brand new fields are offered new responsibilities and more stimulating work. Write Mr. David Tobin or call De 2-5800.

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Dept. 12A, Charlemont St., Newton Highlands 71, Mass.
Please send NRC Vacuum Furnace Bulletin ☐
Have your representative call ☐

Name.....Title.....
Company.....
Address.....
City.....Zone....State.....

REDESIGNED HEADSTOCK is massive, rigid casting, eliminating vibration and assuring maximum accuracy. Electric combination clutch and brake permits fast, smooth starts and stops without overheating. The Gisholt main control (manually or hydraulically operated) and the simple push buttons and feed-stop valves speed changeovers. A wide range of spindle speeds permits peak machining efficiency on all materials.

GISHOLT JETracer (mounted in place of standard front carriage) for either single or multiple pass work. For latter, JETracer will make up to four consecutive, automatic passes from four templates of different lengths and patterns. **Standard rear independent slide** can operate any time within the general machine cycle to complete the part. **Air- or hydraulically-operated tailstock** can be easily mounted, positioned or removed.

High capacity + flexibility = economy

ISN'T THIS WHAT YOU WANT

CONSIDER WHAT YOU CAN DO with this new Gisholt MASTERLINE No. 12 Automatic Production Lathe:

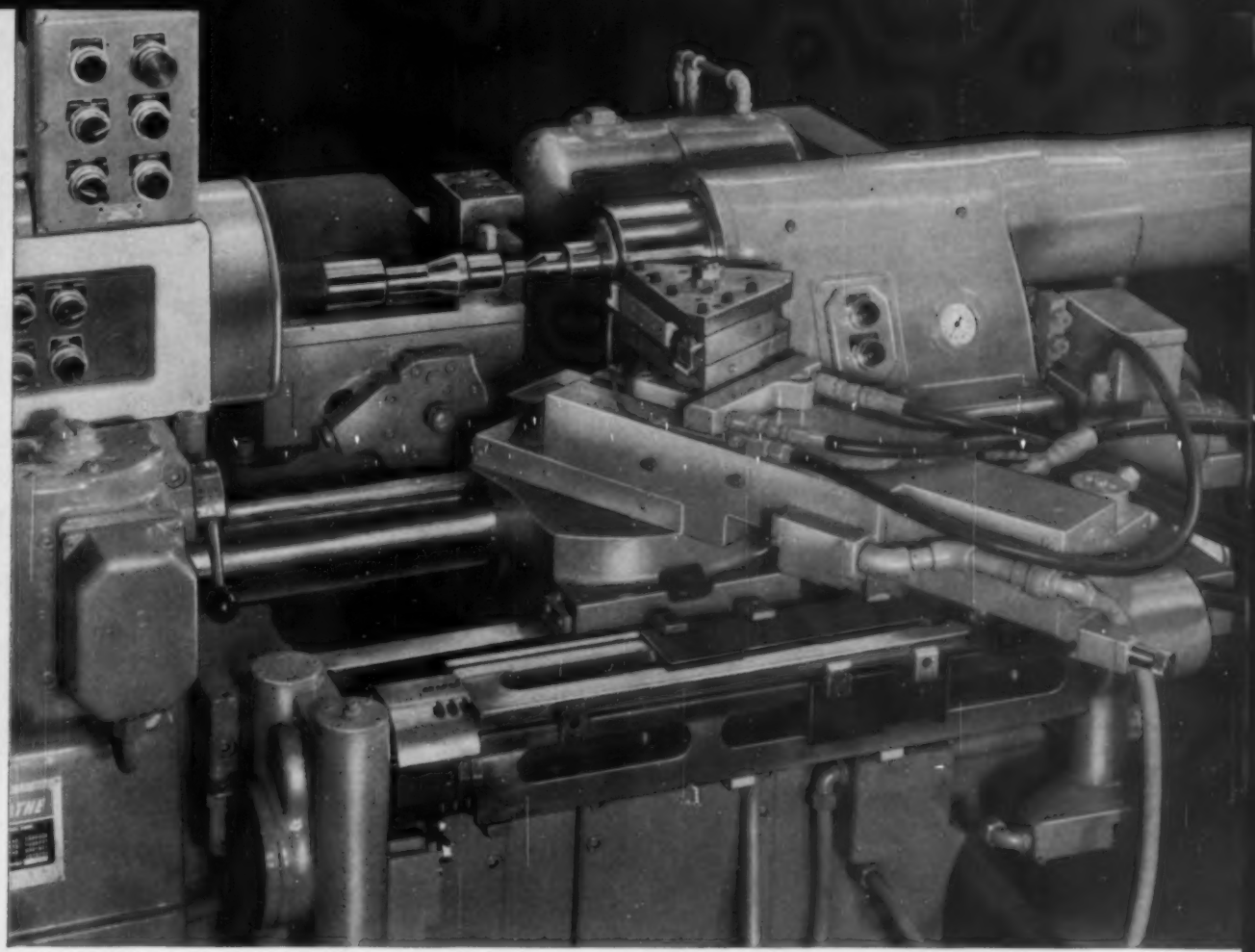
Here is an automatic lathe designed specifically for high production operations—yet this machine is flexible enough to handle a variety of similar parts in small repeat lots.

You can hold work in a chuck or fixture—with a work driver and tailstock—on an arbor or between centers. To start the automatic cycle, your operator simply loads the part, chucks it and raises the Main Control Lever. He is then free to handle additional machines—or to perform other work—until the part is completed.

On the Gisholt No. 12 Automatic, all carriage and slide movements are hydraulically actuated. The front carriage has both longitudinal and transverse motion—or a combination of the two—with quick approach, automatic tool relief and rapid return. You can mount the rear independent slide at any angle to machine bevel gears, drill cones, or handle other parts with angular surfaces.

For special jobs—like machining both ends simultaneously on small motor frames, cylinder sleeves,

MASTERLINE GISHOLT SINCE 1887 GISHOLT



IN AN AUTOMATIC LATHE?

or similar parts— you get even greater flexibility from the No. 12 through auxiliary slides, operated by movement of the standard slides. Or you can mount a back facing attachment within the spindle—for still another way to machine a maximum number of surfaces in one chucking. And for outstanding versatility with great savings in tool and setup costs, the front carriage on the No. 12 may be replaced by a single- or four-pass JETracer slide.

For complete details of the new features on the Gisholt MASTERLINE No. 12 Automatic Production Lathe, call your Gisholt Representative.

WRITE GISHOLT TODAY for advance data on the new Gisholt MASTERLINE No. 12 Automatic Production Lathe. Ask for Form 1178.

GISHOLT MACHINE COMPANY

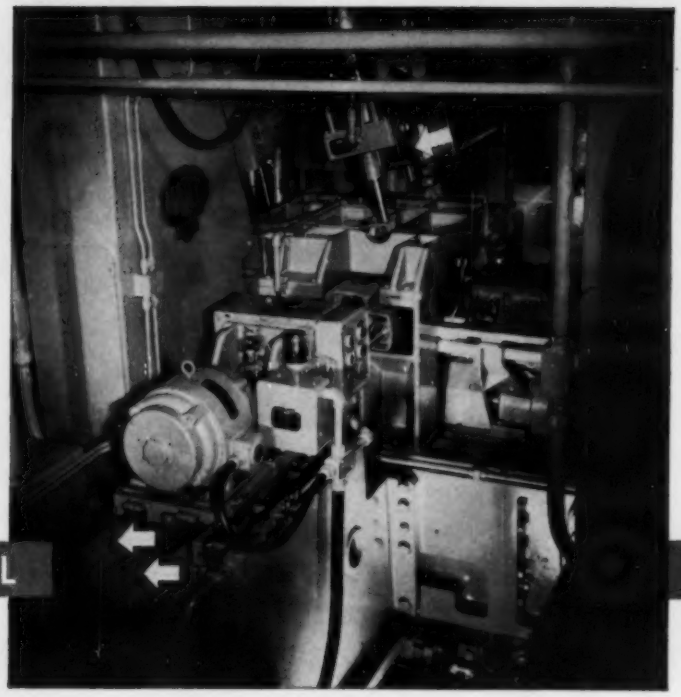
Madison 10, Wisconsin, U.S.A.

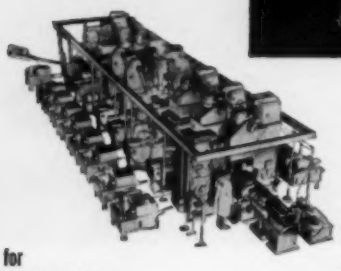
TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • PACKAGING MACHINES • MOLDED FIBERGLAS PLASTICS

50 Auto Blocks An Hour!

WITH THE HELP OF Allegheny Ludlum

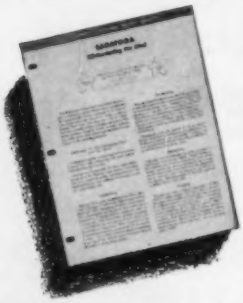
SARATOGA TOOL STEEL





Allegheny Ludlum Saratoga was used for the steel ways (note arrows, above) of this giant unit, illustrated at left in a bird's-eye view reduced to miniature size.

Write for BLUE SHEET ON SARATOGA



This concise four-page folder gives all needed handling and shop treatment details on Saratoga. Included is certified laboratory information on physical characteristics, and complete data on forging, annealing, hardening, tempering, etc. *Ask for your copy.*

ADDRESS DEPT. S-851

98 SEPARATE OPERATIONS are carried on by this versatile machine which turns out 50 V8 auto engine blocks an hour. It consists of 18 machining units, each of which is fitted with hardened and ground steel ways of A-L Saratoga to guarantee accuracy in production.

MILLING, TREPANNING, DRILLING, counterboring, reaming, chamfering, automatic inspection of holes for depth and removal of chips are the operations performed by this amazing mechanism.

SARATOGA WAS USED BECAUSE its extreme hardness, high resistance to wear, and excellent machinability more than met the customer's high requirements for maintaining accuracy in this huge, multi-station machine.

ALLEGHENY LUDLUM METALLURGICAL SERVICE can solve *your* tool or die steel problems. ● Call your local A-L representative or distributor, or write *Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh 22, Pennsylvania.*

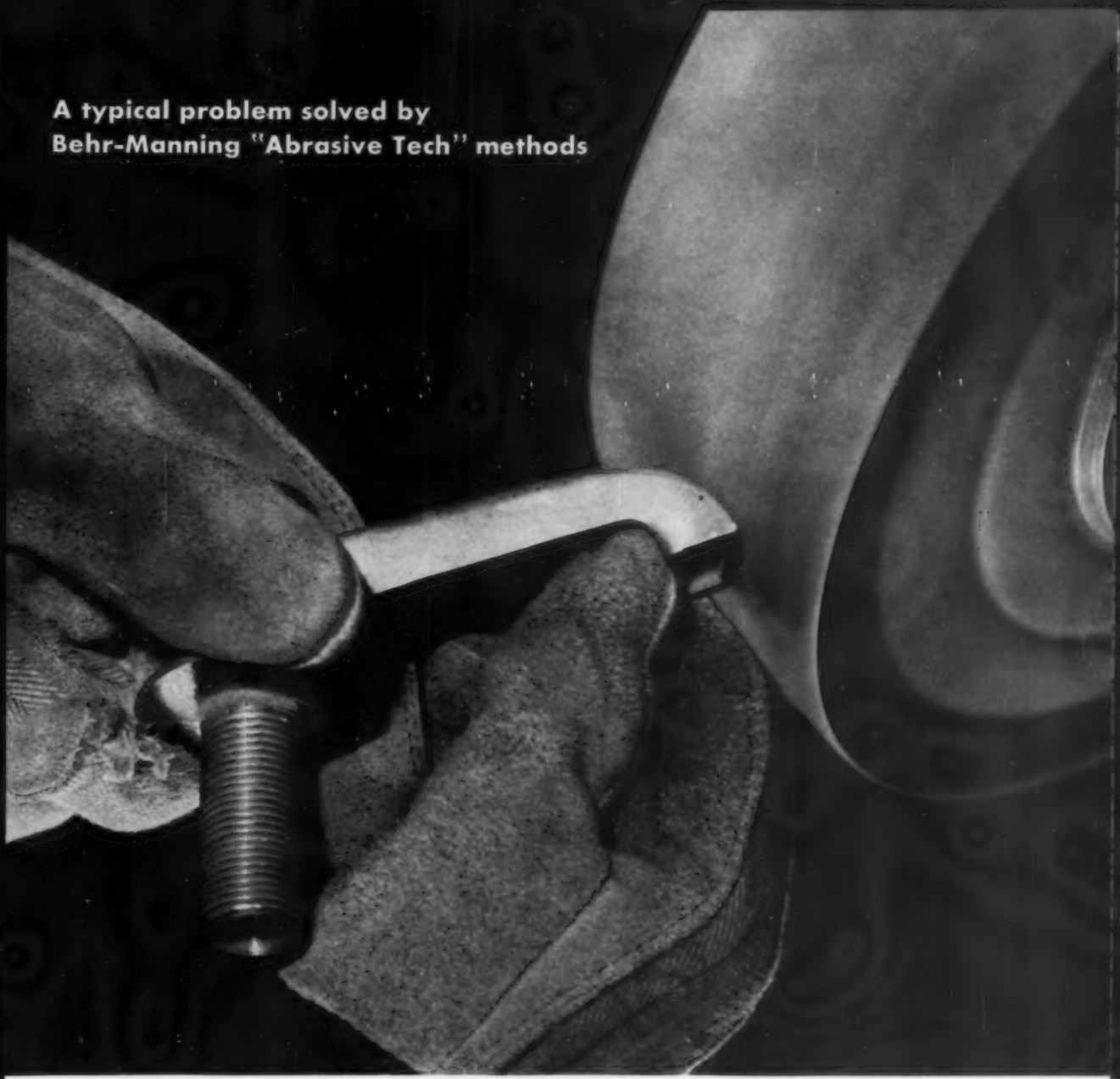
For nearest representative, consult Yellow Section of your telephone book.

For complete **MODERN** Tooling, call

Allegheny Ludlum

WSW 6208

AL® FINE TOOL STEELS SINCE 1854



8 steps in finishing were eliminated by using abrasive belts to rough and polish cast-brass faucets prior to plating. Polishing, for example, was faster and smoother with a 3-in. x 90-in. Lightning Metalite Cloth belt, grit 240, running at 9000 sfpm over a 14-in. stitched buff contact roll on a Crown Rheostat Polishing Lathe. The belt is lubricated with a light grease stick. Time, labor, and material costs have all been cut by this "Abrasive Tech" method. Perhaps Behr-Manning technical service may provide similar benefits for your production.

Very often a Behr-Manning methods engineer can provide a helping hand with different finishing problems. Just call the nearest Behr-Manning office for a date. There are 17 well-equipped "Abrasive Tech" Methods Rooms, available for problem-solving, or helping finishers brush up on new techniques: Atlanta, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Detroit, Grand Rapids, High Point, Indianapolis, Los Angeles, Teterboro, Camden, San Francisco, Seattle, St. Louis, and Brantford, Canada. Main office and plant: Troy, N. Y. For Export: Norton Behr-Manning Overseas, Inc., New Rochelle, N. Y., U.S.A.

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Being interviewed is H. A. Fuggiti, Acting Senior Development Engineer

"Here's where the heavy slugs of power come from"

At the Exide Laboratories — **Reporter:** Just exactly what part of the battery is that, Mr. Fuggiti?

Fuggiti: This is the Exide-Ironclad positive plate. And in any battery, power reserve is governed by positive plate area.

Reporter: Then do you mean that Exide-Ironclad Batteries have *more* positive plate area?

Fuggiti: Exactly. You can see that here. The cylindrical power tubes are arranged in a row. So the semicircular sides give an effective plate area one-third more than the plate size.

Reporter: How does that increase power reserve?

Fuggiti: Because there's a bigger working surface of battery plate exposed to the electrolyte. Power response is faster.

Reporter: What does this mean in battery performance?

Fuggiti: It means the battery can provide power to spare for peak power loads as well as a dependable source for continuous loads.

Reporter: Obviously this is an important feature of the Exide-Ironclad Batteries.

Fuggiti: Yes it is, but it's just one of many engineering details that contribute to their long life and high capacity.

Note to battery users: Whenever you order heavy duty batteries or the equipment that requires them, be sure to specify Exide-Ironclad. For detailed bulletin, write Exide Industrial Division, The Electric Storage Battery Co., Philadelphia 2, Pa.

THE ELECTRIC STORAGE BATTERY COMPANY Exide®

CALENDAR
OF MEETINGS

Jan. 28-31, American Management Association: West coast general management conference, Hotel Statler, Los Angeles. Association's address: 1515 Broadway, New York 36, N.Y. Secretary: Andrew P. Donovan.

Jan. 28-31, Associated Equipment Distributors: Annual meeting and exhibit, Conrad Hilton hotel, Chicago. Association's address: 30 E. Cedar St., Chicago 11, Ill. Executive secretary: P. D. Hermann.

Jan. 28-29, Industrial Heating Equipment Association Inc.: Annual meeting, Shoreham hotel, Washington. Association's address: Associations Bldg., Washington 6, D.C. Executive vice president: Carl L. Ipsen.

Jan. 28-31, Plant Maintenance & Engineering Show & Conference: Public Auditorium, Cleveland. Information: Clapp & Poliak Inc., 341 Madison Ave., New York 17, N.Y.

Jan. 28-Feb. 2, American Road Builders Association: Road show and convention, Congress hotel and International Amphitheatre, Chicago. Association's address: 600 World Center Bldg., Washington 6, D.C. Executive vice president: Louis W. Prentiss.

Feb. 4-6, American Management Association: Marketing conference, Hotel Statler, New York. Association's address: 1515 Broadway, New York 36, N.Y. Secretary: Andrew P. Donovan.

Feb. 4-8, American Society for Testing Materials: Committee week, Benjamin Franklin hotel, Philadelphia. Society's address: 1916 Race St., Philadelphia 3, Pa. Executive secretary: Robert J. Painter.

Feb. 5-7, Society of the Plastics Industry Inc.: Reinforced plastics division conference, Edgewater Beach hotel, Chicago. Society's address: 250 Park Ave., New York 17, N. Y. Executive vice president: William T. Cruse.

Feb. 7-8, American Management Association: Special conference on nucleonics in industry, Hotel Statler, New York. Association's address: 1515 Broadway, New York 36, N.Y. Secretary: Andrew P. Donovan.

Feb. 7-8, Malleable Founders Society: Technical and operating conference, Wade Park Manor, Cleveland. Society's address: 1800 Union Commerce Bldg., Cleveland 14, O. Executive vice president: Lowell D. Ryan.

Feb. 11-13, Drop Forging Association: Winter meeting and exhibit, Edgewater Beach hotel, Chicago. Association's address: 419 S. Walnut St., Lansing 33, Mich. Secretary-treasurer: Richard Marcus.

Feb. 13-15, American Management Association: Mid-winter, personnel conference, Palmer House, Chicago. Association's address: 1515 Broadway, New York 36, N.Y. Secretary: Andrew P. Donovan.

Feb. 24-28, American Institute of Mining, Metallurgical & Petroleum Engineers: Annual meeting, Roosevelt and Jung hotels, New Orleans. Institute's address: 29 W. 39th St., New York 18, N.Y. Secretary: E. O. Kirkendall.

Feb. 25-Mar. 1, International Heating & Air-Conditioning Exposition: International Amphitheatre, Chicago. Information: International Exposition Co., 480 Lexington Ave., New York 17, N.Y. President: E. K. Stevens.

Feb. 25-27, American Management Association: Annual special conference on electronics, Hotel Statler, New York. Association's address: 1515 Broadway, New York 36, N.Y. Secretary: Andrew P. Donovan.

Mar. 5-7, American Machine Tool Distributors Association: Spring meeting, El Mirador hotel, Palm Springs, Calif. Association's address: 1900 Arch St., Philadelphia 3, Pa. General manager: James C. Kelley.

Mar. 5-7, Society of Automotive Engineers Inc.: National passenger car, body and materials meeting, Sheraton-Cadillac hotel, Detroit. Society's address: 485 Lexington Ave., New York 17, N.Y. Secretary: John A. C. Warner.

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A ALWAYS MAKES POSSIBLE
B BETTER PRODUCTS
C AT LOWER COST
A Quality Product
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¼" to 4" O.D. 7 to 22 gauge
SQUARE
Gauge
RECTANGULAR
⅜" to ¾" 16 thru 22
¾" to 1" 11 thru 22
1" to 2" 11 thru 20
2" to 3" 11 thru 18
⅜" minimum side to 5" maximum side
Carbon 1010 to 1025
Standard Sizes
Tube Diameter O.D. Size
Maximum Wall Decimal
BWG Gauge
Minimum Wall Decimal
BWG Gauge
⅛ .065 16 .022 24
⅛ .083 14 .022 24
⅛ .095 13 .022 24
⅜ .095 13 .022 22
¾ .095 13 .028 22
⅞ .095 13 .028 22
1 .095 13 .028 22
1⅛ .095 13 .028 22
1¼ .095 13 .035 20
1⅜ .095 13 .035 20
1½ .120 11 .035 20
1⅝ .120 11 .035 20
1¾ .120 7 .035 20
1⅞ .180 7 .035 20
2 .180 7 .035 20
2⅛ .180 7 .035 20
2¼ .180 7 .035 20
2⅜ .180 7 .035 20
2½ .180 7 .035 20
2⅝ .180 7 .035 20
2¾ .180 7 .035 19
2⅞ .180 7 .042 19
3 .180 7 .042 19
3⅛ .180 7 .042 19
3¼ .180 7 .042 18
3⅜ .180 7 .049 18
3½ .180 7 .049 18
3⅝ .180 7 .049 18
3¾ .180 7 .049 18
3⅞ .180 7
4 .180
For 40 years
Michigan has been manufacturing tubular parts for leading manufacturers. This acceptance of Michigan tubing has been won by meticulous attention to customer requirements and the supplying of the very best in tubing. The following advantages of low cost manufacture and utmost dependability are yours when you specify Michigan for tubular parts in the fabrication of your products:
1. It is fabricated in round, square and rectangular shapes, in a wide range of sizes;
2. It is always of uniform strength, weight, ductility and weldability;
3. It can be flanged, expanded, tapered, swaged, beaded, upset, flattened, forged, spun closed, fluted and rolled.
4. Complete facilities for the COLD DRAWING, ANNEALING and TESTING of tubing we manufacture.
RESISTANCE WELDED STEEL TUBING
Michigan STEEL TUBE PRODUCTS CO.
THE OLDEST NAME IN ELECTRIC
Consult Michigan
for engineering and technical help in the selection of tubing best suited to your needs.
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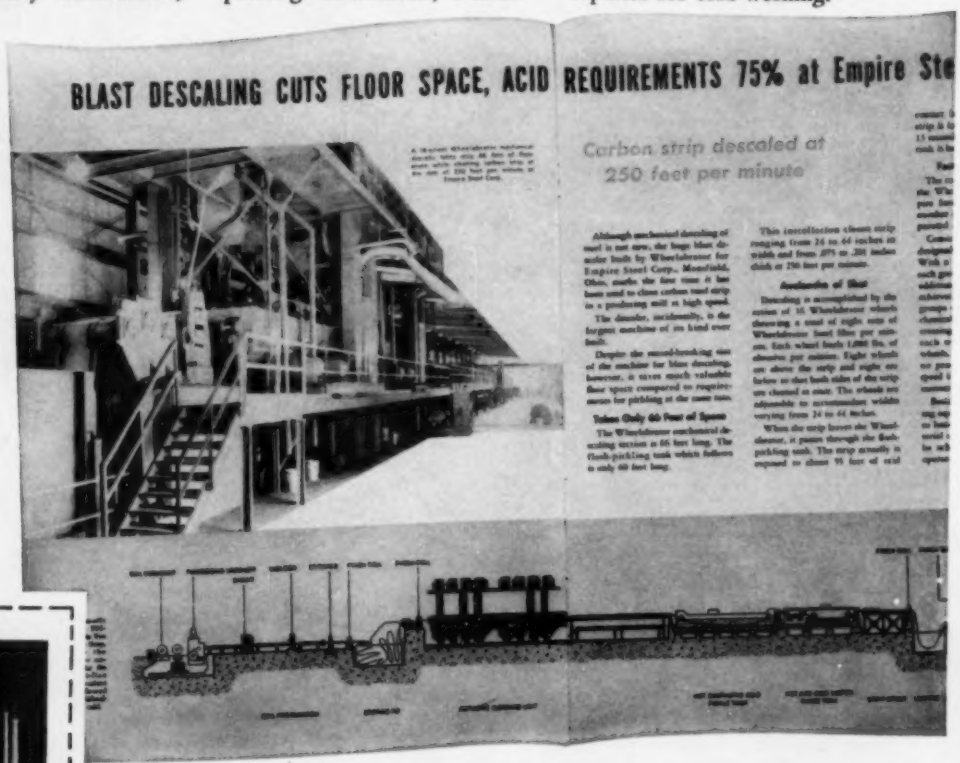
DISTRIBUTORS: Steel Sales Corp., Chicago, St. Louis, Milwaukee, Indianapolis and Minneapolis—Miller Steel Co., Inc., Hillside, N. J.—Service Steel Div., Van Pelt Corp., Los Angeles, Calif.—Donald A. Horston, Cleveland, Ohio—Globe Supply Co., Denver, Colo.—W. A. McMichaels Co., Upper Darby, Pa.—William P. Hall & Associates, Dayton, Ohio—John Emery West, Miami, Florida—Gary A. Osborne, Buffalo, N. Y.—Earle M. Jorgensen Co., Houston, Texas

profit from Wheelabrator® savings

descaling strip and sheet steel

Steel producers and processors are rapidly discovering how Wheelabrator Mechanical Descaling brings savings in time, labor, space and material and results in improved final products. In many installations, mechanical descaling requires only ¼ as much space as acid pickling. In others, labor requirements are reduced as much as 50%. In still others, Wheelabrating saves not only cleaning time but speeds production by permitting straight-line operation not possible with acid pickling. In addition, Wheelabrating removes no virgin metal, thus saving metal. And elimination or reduction of acid pickling saves on acid requirements and minimizes acid disposal problems and expense. While making all these savings, Wheelabrating also provides a matte finish that has proved superior for cold working.



FOR SPECIFIC EXAMPLES OF SAVINGS send today for your free copy of Bulletin 128-D. Actual case histories of Wheelabrator installations show how savings are achieved. Shown above is a report in this highly-informative, thoroughly-illustrated 8-page bulletin.

WHEELABRATOR
CORPORATION
509 South Byrkit Street Mishawaka, Indiana

This GIANT sleeps just once a year

-on Christmas Day

Built at a cost of $2,600,000 by Marion Power Shovel Company, *The Mountaineer* costs $1,000 an hour when idle. As a result, it just isn't permitted to be idle—except on Christmas Day. The rest of the year, it works 24 hours *every day* at the world's largest strip mine, owned by Hanna Coal Company.

Tough, durable USS "T-1" Steel in the dipper, dipper stick, bail and crowd rack helps *The Mountaineer* do more work than any other power shovel in all the world. This machine can pick up 90 tons of overburden in one bite, pile it 290 feet away, to a height of 100 feet, and swing back for another 90-ton load—all in just 45 seconds! Working at this rate, it can move 7 million yards of overburden a month.

And every yard is tough going. USS "T-1" Steel parts must ram through rock and earth, taking terrific impact and shock, even in the dead of winter. They hold up in this service because USS "T-1" Steel retains its amazing toughness at temperatures far below zero . . . and has excellent resistance to impact abrasion.

Weight was saved with USS "T-1" Steel too—a total of 40 tons!—because of its very high yield strength of 90,000 psi and its excellent weldability. In spite of the high strength, Marion had no difficulty welding, forming, and machining this high-quality alloy steel.

• • •

USS "T-1" Steel can help *you*. Consider it where you need high strength, extraordinary toughness, resistance to impact abrasion, or good creep rupture strength *combined* with ease of fabrication. We'll gladly help you adapt it to your particular problem. United States Steel, Pittsburgh 30, Pennsylvania.

USS "T-1" CONSTRUCTIONAL ALLOY STEEL

UNITED STATES STEEL

UNITED STATES STEEL CORPORATION, PITTSBURGH
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.
UNITED STATES STEEL SUPPLY DIVISION,
WAREHOUSE DISTRIBUTORS, COAST-TO-COAST
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS

"We forged 10-foot rings from a 5-foot ingot... in stainless steel"

says **John Matthews,**

U. S. Steel General Foreman—Forging

It required many days to take the photographs on this page, days of forging and re-heating. The forgings are made from type 304 stainless steel, and they're destined for a nuclear power plant. Now read why it took so long to make them.

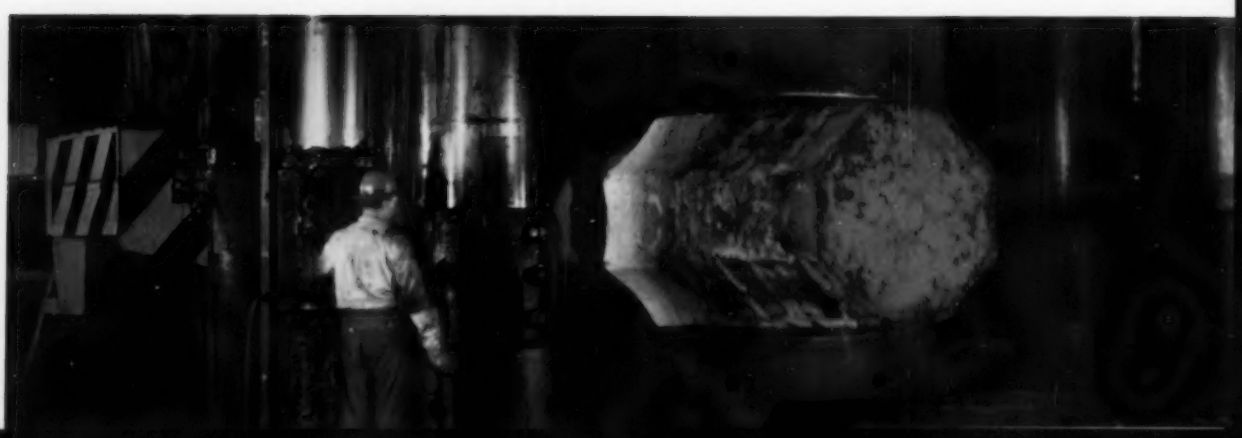
Stainless is strong and stiff, even at forging temperatures. It requires more passes through the press, more die pressure, and the dies wear out faster. If you forge it too long, so that it gets "cold," it will develop small surface cracks beneath the great jaws of the press.

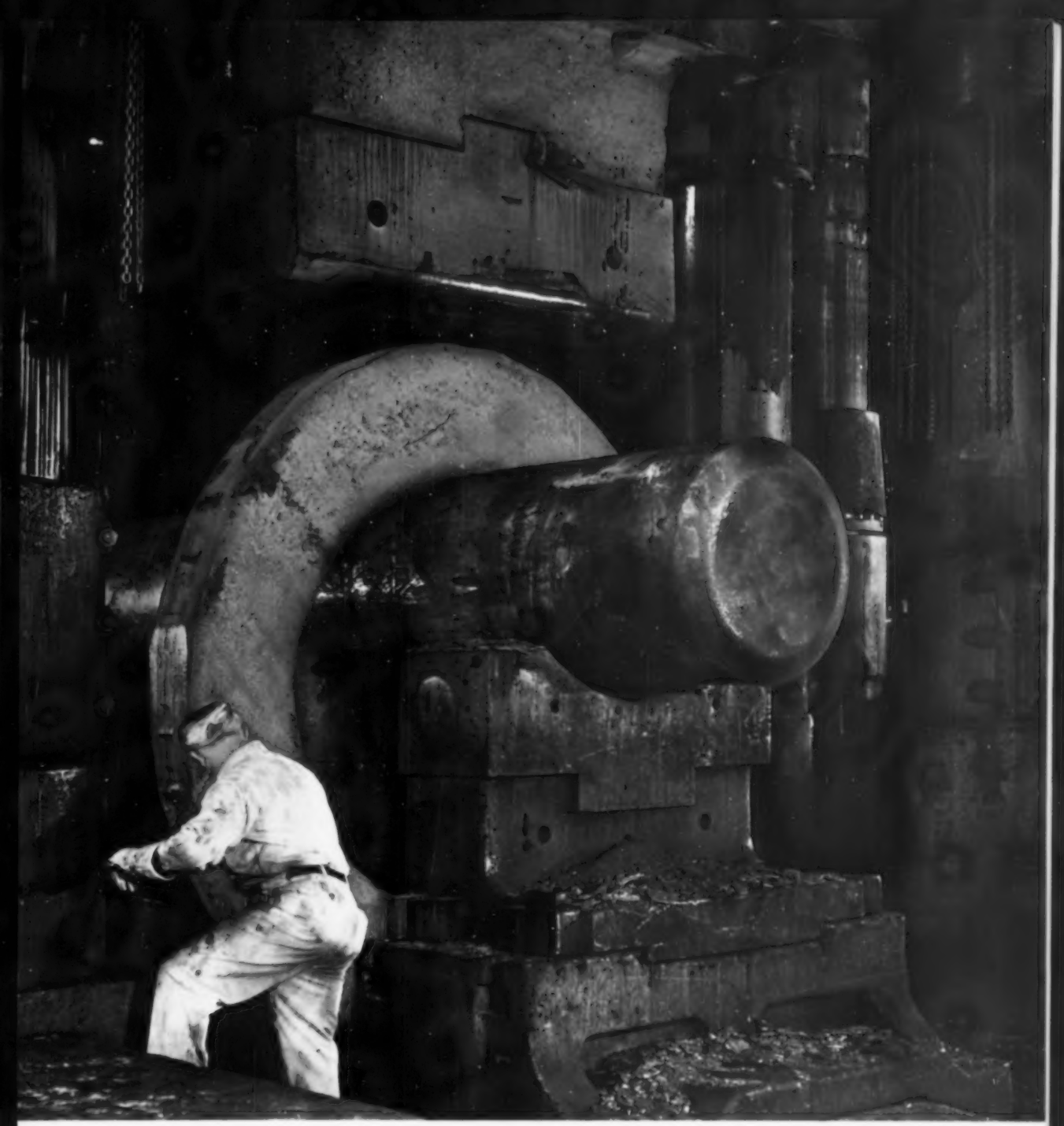
In John Matthews' words:

"We started with a 59″ fluted ingot and forged it down to a 40″ octagon, then sliced it into three flat discs. The thickest disc was forged down to 18″, and we put a 23″ hole through it with steel punches. Then it was worked over the big steel mandrel to finished size: 119″ outside diameter, 80″ inside diameter, 10½″ thick. The other two rings were somewhat thinner."

It was a tricky job, but USS Quality Forgings like this are being turned out every day because we've got the men with the skill to do the job right.

We'll certainly appreciate your inquiries. Send them, or requests for our free 32-page booklet on USS Quality Forgings to: United States Steel, Room 2801, 525 William Penn Place, Pittsburgh 30, Pa.





USS QUALITY FORGINGS

heavy machinery parts . . . carbon, alloy, stainless
forged steel rolls and back-up roll sleeves
electrical and water wheel shafts
specialty forgings of all types

UNITED STATES STEEL

Refractory concrete lining is ready to give rugged service under a variety of temperatures in this forge furnace at Homestead Works, U. S. Steel Corporation, Munhall, Pa. Furnace built by: Amsler Morton Corp., Pittsburgh.

Get maximum durability in refractory installations by using Atlas LUMNITE* cement

- Lumnite-made refractory concrete resists extreme variations in temperature and thermal shock due to rapid heating and cooling.
- Durability under severe operating conditions is assured.
- Placement is fast and easy — service strength is reached within 24 hours. (For maximum convenience, use Lumnite-made castables. These are premixed, ready for use, and are made by leading manufacturers of refractories.) For more information, write: Universal Atlas, 100 Park Avenue, New York 17, N. Y.

UNIVERSAL ATLAS CEMENTS

USS

* "LUMNITE" is the registered trademark of the calcium-aluminate cement manufactured by Universal Atlas Cement Company.

L-141

UNIVERSAL ATLAS CEMENT COMPANY—member of the industrial family that serves the nation—**UNITED STATES STEEL**

OFFICES: *Albany · Birmingham · Boston · Chicago · Dayton · Kansas City · Milwaukee · Minneapolis · New York · Philadelphia · Pittsburgh · St. Louis · Waco*

Tuffy® Sling Bulletin

Reporting the Outstanding Performance of Union Wire Rope's Machine-Braided Wire Fabric Slings.

3,200-Lb. Bell Rides High on 1½-Lb. Tuffy Sling

Tuffy takes unusual jobs in stride. The bells are safely in place atop the 180-ft. carillon tower of the new St. Luke's Methodist Church in Oklahoma City, and a Tuffy Sling played an important part in getting them there.

The contractor (who used Union Wire Rope 100% on this building) asked Union Wire Rope Corporation to come up with a sling strong enough to lift the 42 bells (one at a time) into place in the tower. The bells ranged from a little fellow of 22 pounds to a giant of 3200 pounds. What's more, an eye of the sling would have to be put through a 1-inch hanger at the top of the smallest bell.

Ticklish assignment? You bet. Those bells were made to special order in Holland. But we had the answer in one of our ⅜-inch U-1 Tuffys. The job of raising $31,000 worth of bells, entrusted to a $7.40 Tuffy Sling, was safely accomplished.

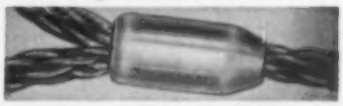
Machine-Braided Wire Fabric Popular Successor to Wire Rope in Sling Construction

The unique machine-braided construction of Tuffy slings provides a combination of super flexibility and extra toughness never possible with ordinary wire rope. The difference is in the patented 9-part fabric, braided by machine in a process that eliminates inequalities of hand-braiding. Result: a fabric which can be bent easily and repeatedly around small radii or abrupt corners.

So Flexible Kinks Pound Out Without Sling Damage

Tie a knot in a Tuffy sling. Pull it as tight as you can with your hands and feet. Then untie it. See how easily the braided fabric straightens out again. You kink it with the aid of a vise, but it's still easy to straighten the fabric without material damage. If one of the nine parts is cut or broken under severe punishment or abuse, it does not result in stranding. No need to tell you this flexibility eases and speeds the hitching and unhitching of loads.

Tuck-Splicing & Pressed-On Ferrule Make Eyes "Tuffy Tough"



The development of Tuffy machine-braided fabric, with its big user-economies of greater strength, faster handling and longer service life—was followed by the introduction of the revolutionary Tuffy ferrule.

This ferrule, slipped over the tuck-splice of the eye and pressed on under great pressure, holds so tight that it gives the eye of the sling 100 per cent of the strength of the fabric. Result: greater safety, speedier handling, more sling-eye strength—at no increase in cost!

Mail Coupon for Free Tuffy Sling Handbook

60 pages packed with information about new, factory-fitted Tuffy slings with pressed-on super-strength ferrule. Plus facts on nearly a dozen new and standard fittings, and complete data and charts on all Tuffy slings. And a brand-new engineer's notebook and riggers manual. Send for your copy now.

For Canada, Safety Supply Co., Toronto

union Wire Rope corp.

2160 Manchester Avenue, Kansas City 26, Mo.

Specialists in high carbon wire, wire rope, braided wire fabric, stress relieved wire and strand

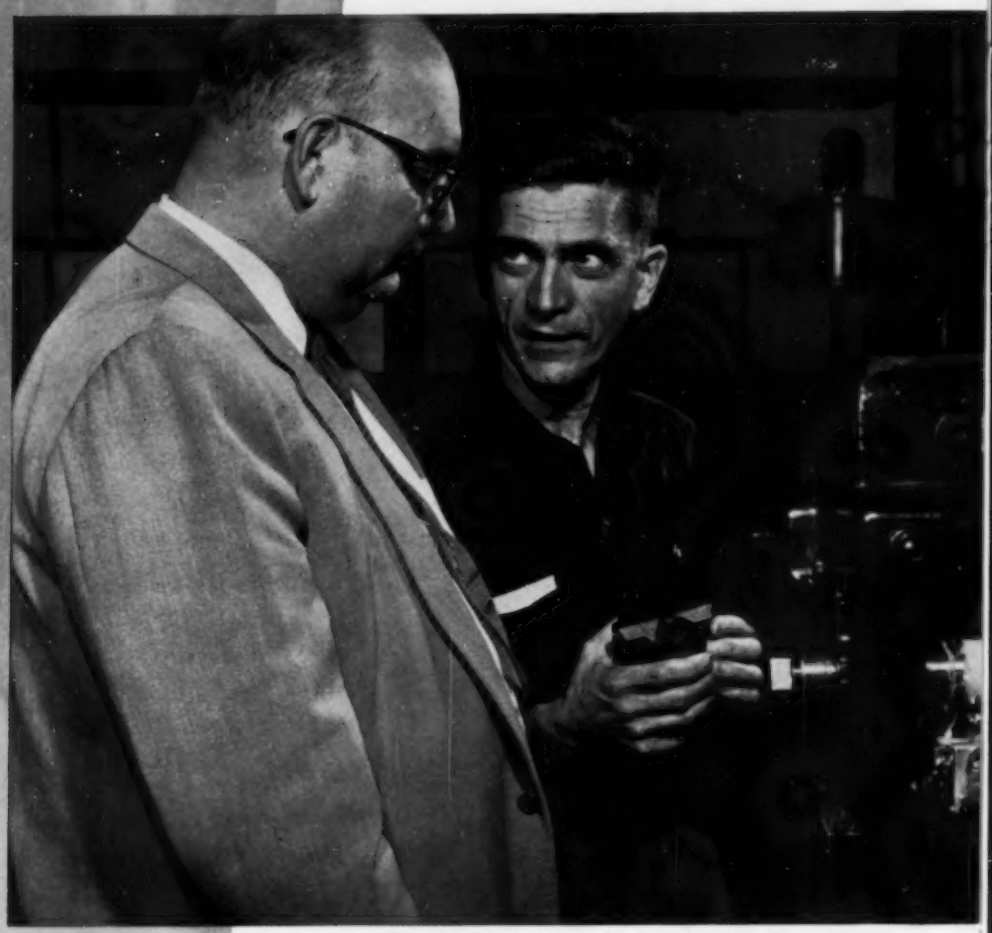
MY NAME_____ TITLE_____

COMPANY NAME_____

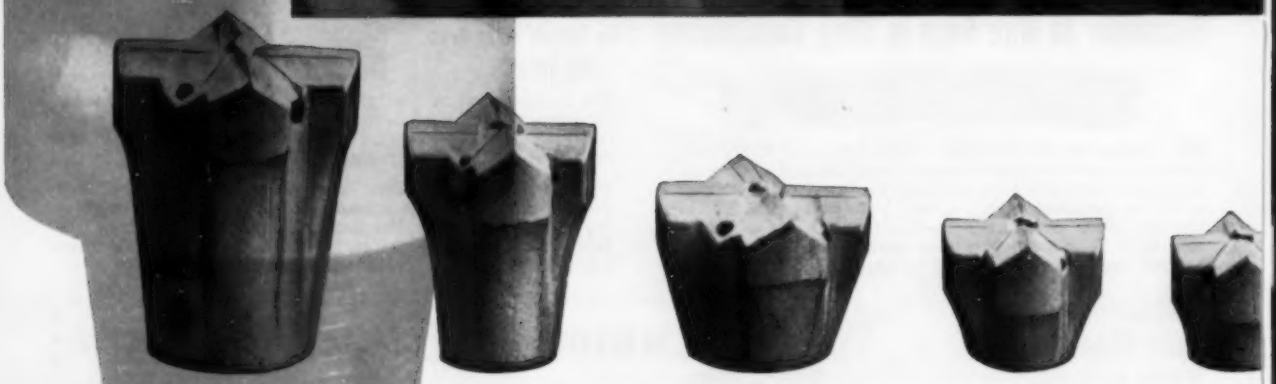
ADDRESS_____

1. CITY_____ ZONE____ STATE_____

Bit manufacturer bites off



George P. Gaunt (right) shop superintendent shuws rock bit to Joseph D. Grigas, industrial lubrication specialist at Standard Oil. Joe recommended switch to SUPERLA Soluble Oil. Joe is well qualified to make such recommendations. He has 13 years experience in such work, has a degree in engineering from Illinois Institute of Technology and is a graduate of the Standard Oil Sales Engineering School.



Brunner & Lay carbide insert rock bits are made from high chrome—nickel—moly steel, Rockwell 18C-22C hardness.

20% production increase

SUPERLA Soluble Oil plus technical service add up to improved product output at Chicago Brunner & Lay Rok-Bit Corp.

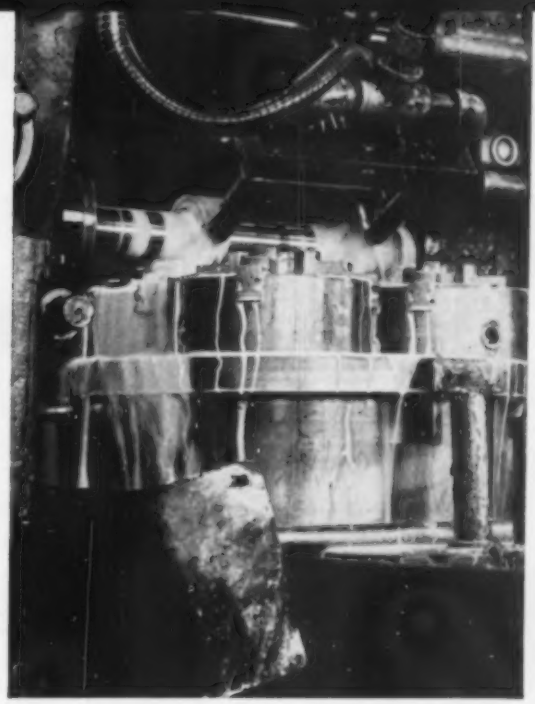
SUPERLA Soluble Oil, which is now being used by Chicago Brunner & Lay Rok-Bit Corp., has solved a lot of milling machine operating problems for the Company. Soluble oils formerly used separated out of emulsion and turned rancid in use. Oil circulating lines plugged repeatedly. The plant's production rate was not up to capacity because of frequent shut downs for cleaning of machines and for unplugging of oil lines.

On the advice of Joe Grigas, Standard Oil industrial lubrication specialist, the Company thoroughly cleaned the machines, then converted them to SUPERLA using the soluble oil at 10:1 dilution.

This is how the change-over worked out. *Production was increased 20%.* Machine down time was substantially reduced. The Company was sufficiently pleased with the performance of SUPERLA Soluble Oil in milling machines to convert two grinding machines to this oil. Results obtained on the grinding machines: excellent wheel life, good finish and rust protection of work and machines.

SUPERLA Soluble Oil emulsifies readily with all types of water. It is a stable oil and forms stable emulsions. It does not tend to develop objectionable odors in use nor is it injurious to men, work or machines. SUPERLA Soluble Oil gives good tool life and prevents rust.

Get the facts about SUPERLA Soluble Oil. Your Standard Oil industrial lubrication specialist has them. In any of the 15 Midwest or Rocky Mountain states, one of these lubrication specialists is nearby. Call the one nearest you. Or write Standard Oil Company, 910 S. Michigan Ave., Chicago 80, Ill.



Milled slots up to ⅞" wide and 1" deep are made in this special alloy Rok Bit Steel in one cut. All of these milling machines use SUPERLA Soluble Oil exclusively.

Quick facts about
SUPERLA Soluble Oil

- **Emulsifies readily**
- **Forms stable emulsion**
- **Doesn't turn rancid**
- **Economical. Requires low emulsion concentrations**
- **Prevents rusting**
- **Non-injurious to men, machines, work**
- **Gives good tool life**

STANDARD OIL COMPANY (Indiana)

STANDARD

for convenient nearby service

For anything in special steel – *call Crucible.* Our nationwide chain of warehouses covers every industrial center in the country – makes the full range of Crucible specialty steels quickly available to you, wherever you are located.

Stocks maintained of:
Rex High Speed Steel...ALL grades of Tool Steel (including Die Casting Die and Plastic Mold Steel, Drill Rod, Tool Bits, and Hollow Tool Steel Bars) . . . Stainless Steel (Sheets, Bars, Wire, Billets, Electrodes) . . . Max-el, HY-Tuf, AISI Alloy . . . Onyx Spring, Hollow Drill Steel and other special purpose steels.

So for fast, *local* service on special steel orders – whether you want a pound or a ton – always call Crucible – *big enough to serve you . . . small enough to want to.*

CRUCIBLE WAREHOUSE SERVICE

Crucible Steel Company of America

Why hats are off to CIMCOOL...

. . . because CIMCOOL® has become, in just a few years, the largest selling cutting fluid in the world. And sales of this radically new and different coolant are continuing to climb because CIMCOOL Standard Concentrate has two big advantages over old-fashioned cutting fluids:

- **CIMCOOL LOWERS COSTS** because it's longer lasting in machines. Thus, it reduces downtime and cuts labor costs for cleaning and changing.
- **CIMCOOL DOES A BETTER JOB** because of its chemical lubricity. It permits faster speeds and increases tool life, for it combines friction reduction and cooling capacity in a degree never before attained.

We'll be happy to supply information on the many specific advantages of CIMCOOL Standard Concentrate—or details on the entire family of CIMCOOL Cutting Fluids. Just contact us and we'll have one of our Cincinnati Milling-trained machinists call on you —without cost or obligation. Wire, write, or telephone Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

®Trade Mark Reg. U.S. Pat. Off.

CIMCOOL CUTTING FLUIDS

CIMCOOL **Concentrate**—The famous pink fluid which still covers 85% of all metal cutting jobs. Effective, economical and clean.

CIMCOOL **Tapping Compound**—Permits the use of highest tapping speeds and increases tap life amazingly.

CIMPLUS The transparent grinding fluid with exceptional rust control. Also used for machining cast iron and as a water conditioner with CIMCOOL Concentrate.

CIMCUT **Base Additive**—For jobs requiring an oil-base cutting fluid. Added to mineral oils, it gives an economical mix for higher speeds and feeds.

CIMCOOL **Bactericide** — The most effective agent yet developed to overcome rancidity and foul odors.

CIMCOOL **Machine Cleaner** — The two-phase non-corrosive cleaner that removes grit, dirt, slime and oil.

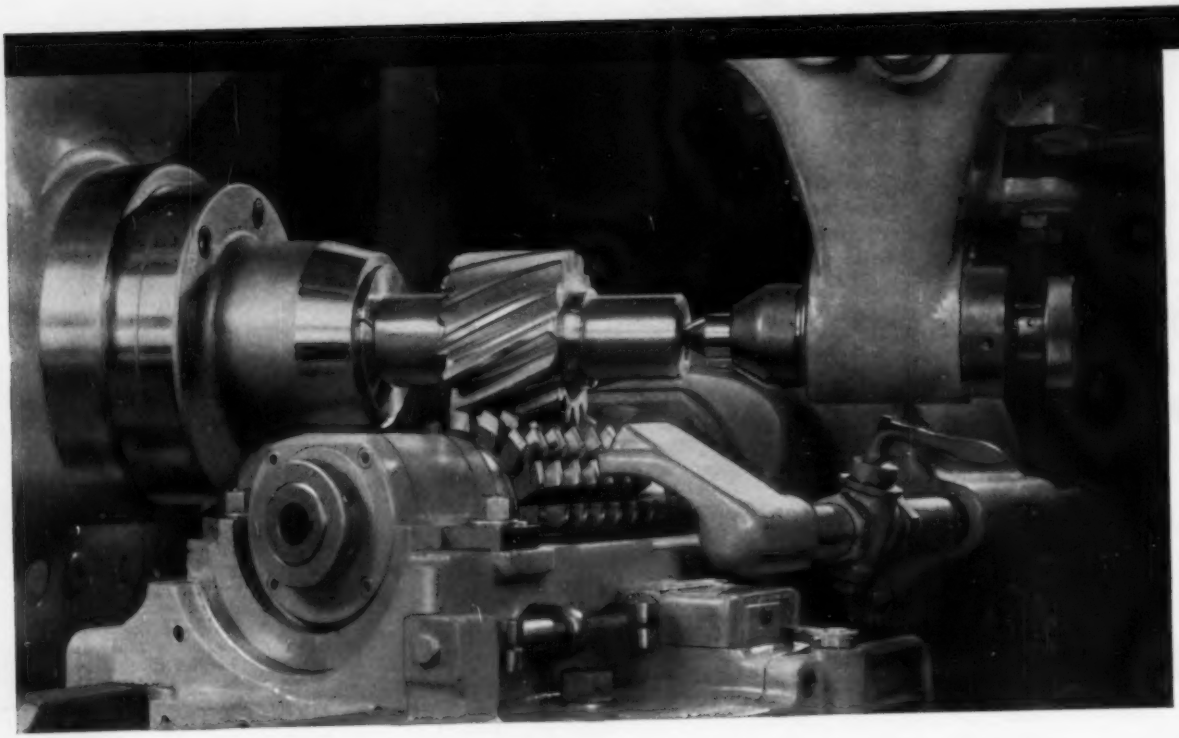
CIMCOOL Cutting Fluids

for 100% of all metal cutting jobs

PRODUCTION-PROVED PRODUCTS OF THE CINCINNATI MILLING MACHINE CO.

crown hobbing

saves time and cost in producing accurately crowned gears



Crown-hobbing on this special Barber-Colman No. 14-15 Hobbing Machine is an ideal production method of generating crowned gear teeth. Where gears are now hobbed and then crown-finished in a secondary operation, they may be crown-hobbed in one operation. When a hobbed finish is satisfactory, the shaving operation can be completely eliminated. If the degree of finish required calls for a further finishing operation, such gears may be finished after crown-hobbing at less cost and in less time because hobbing provides uniform stock removal.

Crown-hobbing also makes it possible to hold a change in tooth thickness within the desired limits, and the tooth bearing can be located at the most desirable point consistent with the job conditions.

In the operation shown here, 4 DP., 14T, 18° P.A. transmission gears with 2¾" face are crown-hobbed on a special Barber-Colman No. 14-15 Hobbing Machine. Teeth are hobbed with a change in tooth thickness of .0045". The automatic cycle includes rough hobbing R. to L. at a given depth, automatic lowering of the work slide against the crowning cam, climb hobbing L. to R. at a constantly changing depth, and rapid traversing out of cut. No further finishing is required in this particular case, and the gears are completed in one automatic operation, without changing tools or transfer to other machines. Savings on this part can be expected on the basis of the following comparison:

typical gear-crowning	crown-hobbing
Rough hob gear teeth.	Manually unload and load.
Transfer to other machine.	Automatic cycle — rough hob.
Semi-finish hob gear teeth.	R. to L., set to finish depth, and crown hob L. to R.
Transfer to next machine.	Manually unload and load.
Crown-finish gear teeth.	

The machine can be designed to suit your job requirements, either as a single-purpose machine, or as a universal machine for both crown and conventional hobbing. Parts can be hobbed in one or two cuts, depending upon specifications of the part. The cam can be designed to produce the tooth configuration required.

The machine required for crown-hobbing is provided with a cam mechanism for raising and lowering the work slide to produce a change in tooth thickness. The work slide is held against the rotary cam by hydraulic pressure in addition to its own weight. Change gears are provided in the cam drive so that different amounts of change in tooth thickness can be produced with the same cam.

Send us drawings of your crowned-gears. Our engineers will analyze the job conditions and make recommendations for crown-hobbing.

BARBER-COLMAN COMPANY

731 ROCK STREET • ROCKFORD, ILLINOIS

Hobs • Cutters • Reamers • Hobbing Machines • Hob Sharpening Machines

BARBER COLMAN

Headquarters of the Metallurgical Products Department of General Electric Company, 11141 E. 8 Mile Blvd., Detroit 32, Michigan. Carboloy Cemented Oxide and carbides are made here. G-E permanent magnets and specialty resistors are manufactured in the Edmore, Mich., plant.

INDUSTRY CAN EXPECT FROM ELECTRIC'S PRODUCTS DEPARTMENT

The new G-E Metallurgical Products Department is the successor to the Carboloy Department. Here's what this change will mean for you.

Since 1928, the General Electric trademark "Carboloy" has been identified with a brand of cemented carbide. But today, Carboloy® cemented carbides are just one of a broad range of products which bear the famous Carboloy trademark.

Cemented Oxide, the Machinability Computer, toolholders, diamond dressers, drawing and forming dies . . . these are on the market today. Tomorrow, you will see many other new-product developments for the Metalworking Industry.

With carbides like the new Extra-Performance Series 300 steel-cutting grades, these products are being made available to you through a distribution team which is unmatched in the carbide industry from the standpoint of inventory, delivery, and service.

In addition, the Metallurgical Products Department makes other products which carry only the General Electric trademark: permanent magnets, vacuum-melted alloys, hevimet, thermistors, and Thyrite® varistors. And on the industrial horizon are G-E man-made diamonds.

Thus, the new departmental name symbolizes the broadened scope of this Department's activities. Equally important, it indicates how vitally interested General Electric is in the Metalworking Industry.

Many of the products listed above are the result of fundamental investigations carried out at the G-E Research Laboratory in Schenectady. Many new developments in machining, forming, and drawing techniques are the work of G-E Engineers. And, when new products and methods are developed for the Metalworking Industry by General Electric, they, too, will come to you from the Metallurgical Products Department.

Progress Is Our Most Important Product

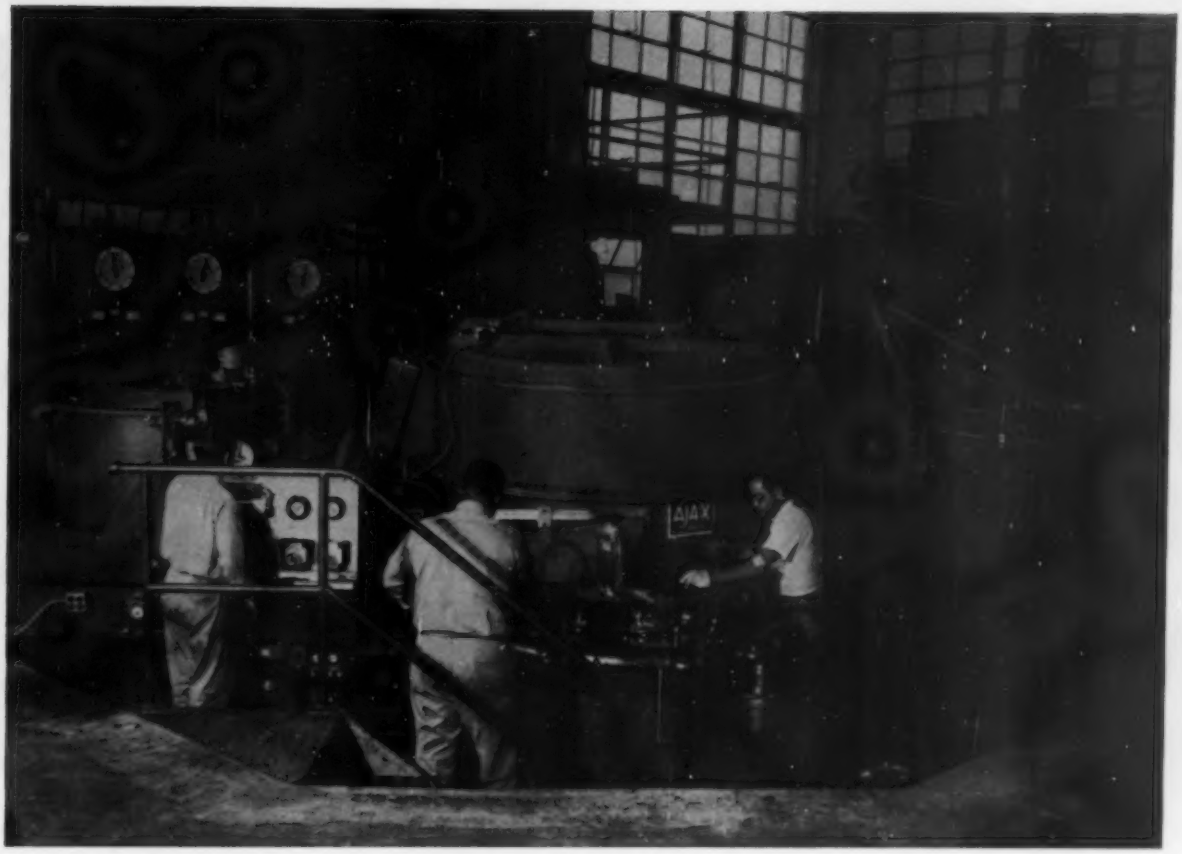
GENERAL ELECTRIC

Roebling Royal Blue Wire Rope will **bend** and **bend** and **bend!**

What's more, Roebling Royal Blue is *stronger* than the strongest wire rope previously available. It will do more work and last longer on *your* job. Call your distributor or your nearest Roebling office for full information about Royal Blue, the really better wire rope. John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

ROEBLING

Distributors, Branches and Warehouses Throughout the Country—Subsidiary of The Colorado Fuel and Iron Corporation



MODERN ALUMINUM BILLET CASTING

Only the best in extrusion billet quality is good enough for **The Himmel Brothers Company**, Hamden, Conn. They produce architectural aluminum extrusions, most of which are subsequently anodized. Their new electric billet casting shop using an integrated group of induction melting furnaces has assured a consistent supply of top quality extrusion billets.

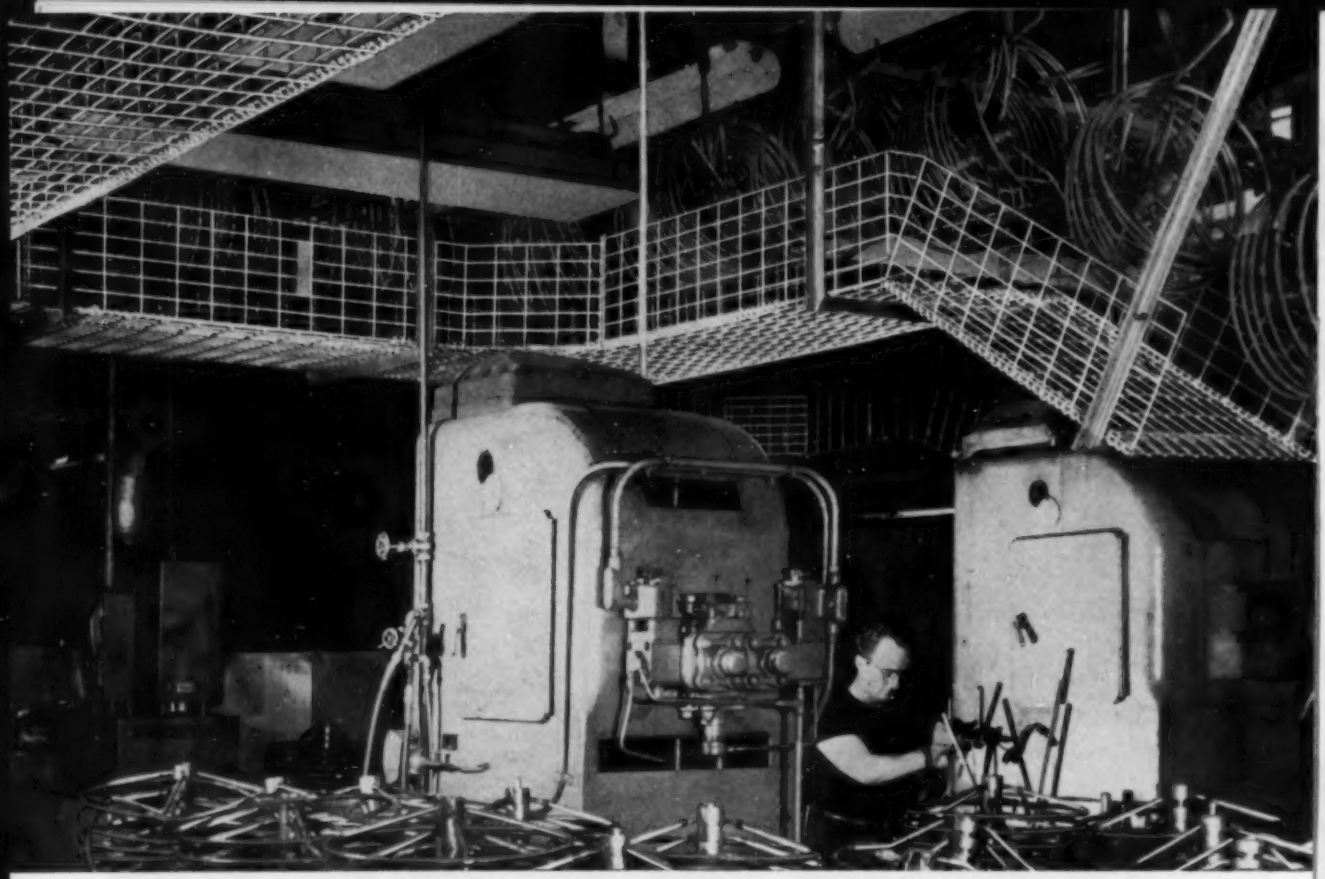
Billets are turned out at the rate of 2000 lbs. per hour by one supervisor and two men. Clean and cool working conditions, extensive automation, and negligible furnace maintenance provide a high return on this investment.

We should be pleased to give you more facts about this modern way of melting aluminum.

AJAX ENGINEERING CORP., TRENTON 7, N. J.

AJAX TAMA-WYATT = **INDUCTION MELTING FURNACE**

AJAX ELECTRO METALLURGICAL CORP., and Associated Companies
AJAX ELECTROTHERMIC CORP., Ajax-Northrup High Frequency Induction Furnaces
AJAX ELECTRIC CO., The Ajax-Hultgren Electric Salt Bath Furnace



Pittsburgh Steel Conveyor Guard in this midwestern auto parts plant was installed faster and easier than alternate systems.

New Use For Wire Mesh—Conveyor Guard Cuts Costs In Auto Parts Plant

Pittsburgh Steel Products Engineers Design Guard Which Goes Up Faster, Easier

Pittsburgh Steel wire mesh Conveyor Guard is marking up substantial savings for a giant Ohio auto parts manufacturer.

Conveyor Guard, a new product of Pittsburgh Steel Products, a division of Pittsburgh Steel Co., is proving in actual use that it has these money-saving advantages.

1. It goes up faster and easier.

2. Regular maintenance crews can remove and relocate Conveyor Guard quickly without damage.

3. Cost of installation and relocation is slashed.

4. Conveyor Guard collects less dirt and retains its pleasing appearance.

5. The need for lateral framing is eliminated.

6. Conveyor Guard is supported on 8-foot centers instead of conventional 4 or 5-foot centers necessary with other materials.

The huge 28-building plant uses its extensive overhead conveyor systems as a ready-made storage bank for materials and parts to save floor space and keep supplies close at hand.

On the steering wheel line, for example, heavy steel steering wheel inserts shown in the photographs pass into the building on an overhead conveyor, move up one side of a long building and then pass down the production line for plastic molding and other operations.

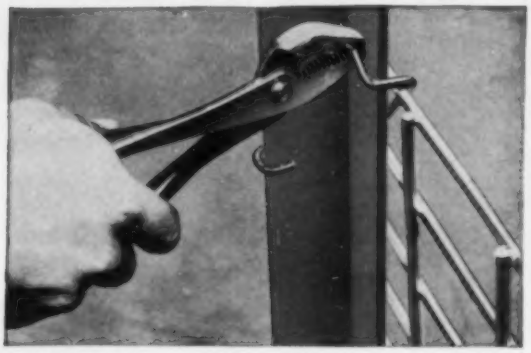
Since these overhead conveyors customarily carry many more inserts than are needed to keep production running smoothly, they must move a tremendous load high above heads of workers below. Adequate protection is a must. Pittsburgh Conveyor Guards provide the needed protection without requiring maintenance.

• **Passes All Tests**—Working from blueprints of a new steering wheel line conveyor system, Pittsburgh Steel Products' engineers designed a guard which passed all the tests of the customer's materials handling engineers and plant layout men. Now, day after day, Pittsburgh Conveyor Guard is proving itself on the job.

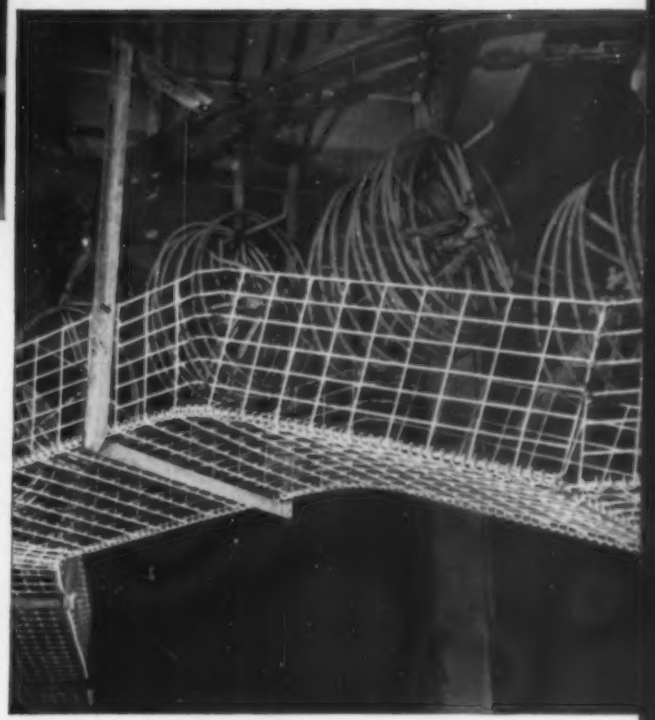
About 570 linear feet of Conveyor Guard were used in the first installation. It consisted of No. 2 gage steel wire welded into a 2 x 4-inch mesh and supplied in standard 8-foot

(Advertisement)

Three big advantages of Pittsburgh Steel Conveyor Guard are pictured here. 1. Fastening is secure, quick and simple. 2. Rises are made by bending the wire mesh on the job. 3. Each 8-foot long section is helixed to the next section in final position.



One twist with a pair of pliers and the wire clip is securely and permanently fastened.



Neat, pleasing appearance of Pittsburgh Steel Conveyor Guard is an added bonus. Less dirt collects on wire mesh.

lengths. The mesh is 2 or 4 feet wide, depending on whether it is designed to safeguard one or two conveyor lines.

Each 8-foot length is helixed on both sides to an 8-foot long piece of mesh one foot wide. These foot-wide sections are installed at right angles to the wide sections to provide the side walls of conveyor guards.

Installation is quick and easy with simple tools. The guard rests on angle irons measuring $1\frac{1}{2} \times 1\frac{1}{2} \times \frac{3}{16}$ inches. Each section of Conveyor Guard is helixed to the section ahead of and behind it and the wire mesh is curved right on the job when a rise is necessary.

Right angle turns are made by cutting sections to fit. In some situations, sections are welded instead of helixed together. These corner sections can be made on the spot or can be purchased custom-made from Pittsburgh Steel Products.

• **Custom-made Corners**—The auto parts manufacturer first bought corner sections from Pittsburgh Steel Products but later made them in his own plant from standard 8-foot long sections when he found this fabrication was a simple operation his own men could do rapidly.

At a rise, a section of mesh is bent up to the right position and welded or helixed to the end of the next section. Pieces can be cut from a section if necessary to make a fit, or filled out with odd pieces of fabric.

Welding this mesh offers no problems. Strong welds are made easily in minutes.

Wire mesh Conveyor Guard is fastened to supporting angles with a special clip designed and supplied by Pittsburgh Steel Products (see photo).

• **Made Good On Job**—After a try-out period on the steering wheel line, company executives predicted further use of the new type Conveyor Guard on future installations.

You can benefit from these same advantages for real economies. Here's the answer to materials handling problems that arise from outmoded, high-cost conveyor guards. Call or write the nearest Pittsburgh Steel Products sales office listed below to get the help of a representative trained in materials handling.

Whether you're installing a new conveyor, extending your present system or relocating an existing conveyor, you'll save by getting in touch with a Pittsburgh Steel Products man. Call him today.

Pittsburgh Steel Products

a division of Pittsburgh Steel Company

Grant Building • Pittsburgh 30, Pa.

District Sales Offices

Atlanta	Columbus	Detroit	New York	Tulsa
Chicago	Dallas	Houston	Philadelphia	Warren, Ohio
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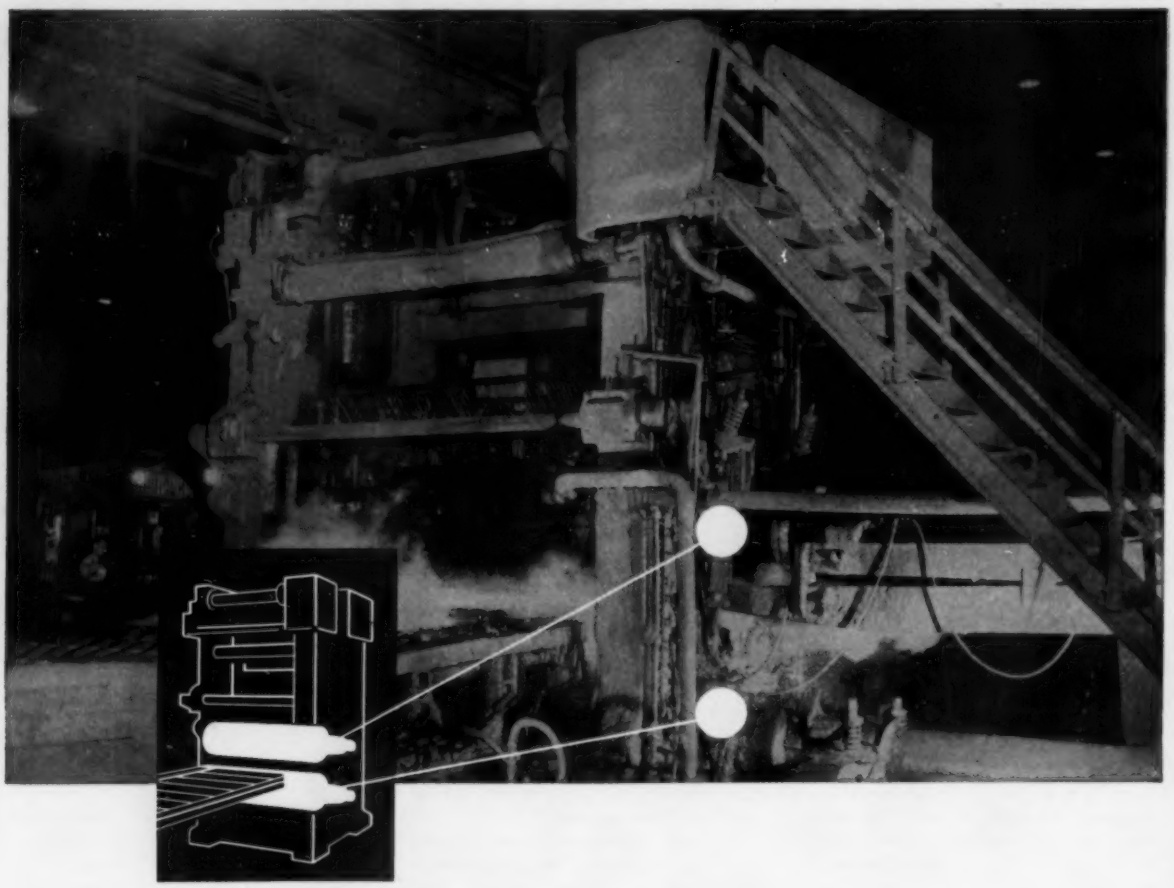
(Advertisement)

Lubricating roll necks is no easy job



Lubricating the roll necks of a steel mill calls for a lubricant that will resist high temperatures. The lubricant must also function in the presence of steam, water, mill scale and other abrasive materials. It has to cushion great shock loads and cling tenaciously to the bearings it protects. It must last a long time... and it must be economical in use.

Atlantic Lubricant 10 performs exceptionally well in this service. It is being used in a pressure system on the mill illustrated, at the Lukens Steel Company in Coatesville, Pa., for the lubrication of roll neck bearings, pinion and spindle bearings.

Selecting the correct lubricant for the job is simplified when you call in your Atlantic Lubrication Engineer. He is a man with years of on-the-job knowledge of heavy industrial lubrication requirements of all kinds.

Why not see for yourself the value of Atlantic service? Just write, wire or phone the office nearest you for full information. The Atlantic Refining Company, Dept. S-1, 260 South Broad Street, Philadelphia 1, Pa.

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430 Hospital Trust Bldg.
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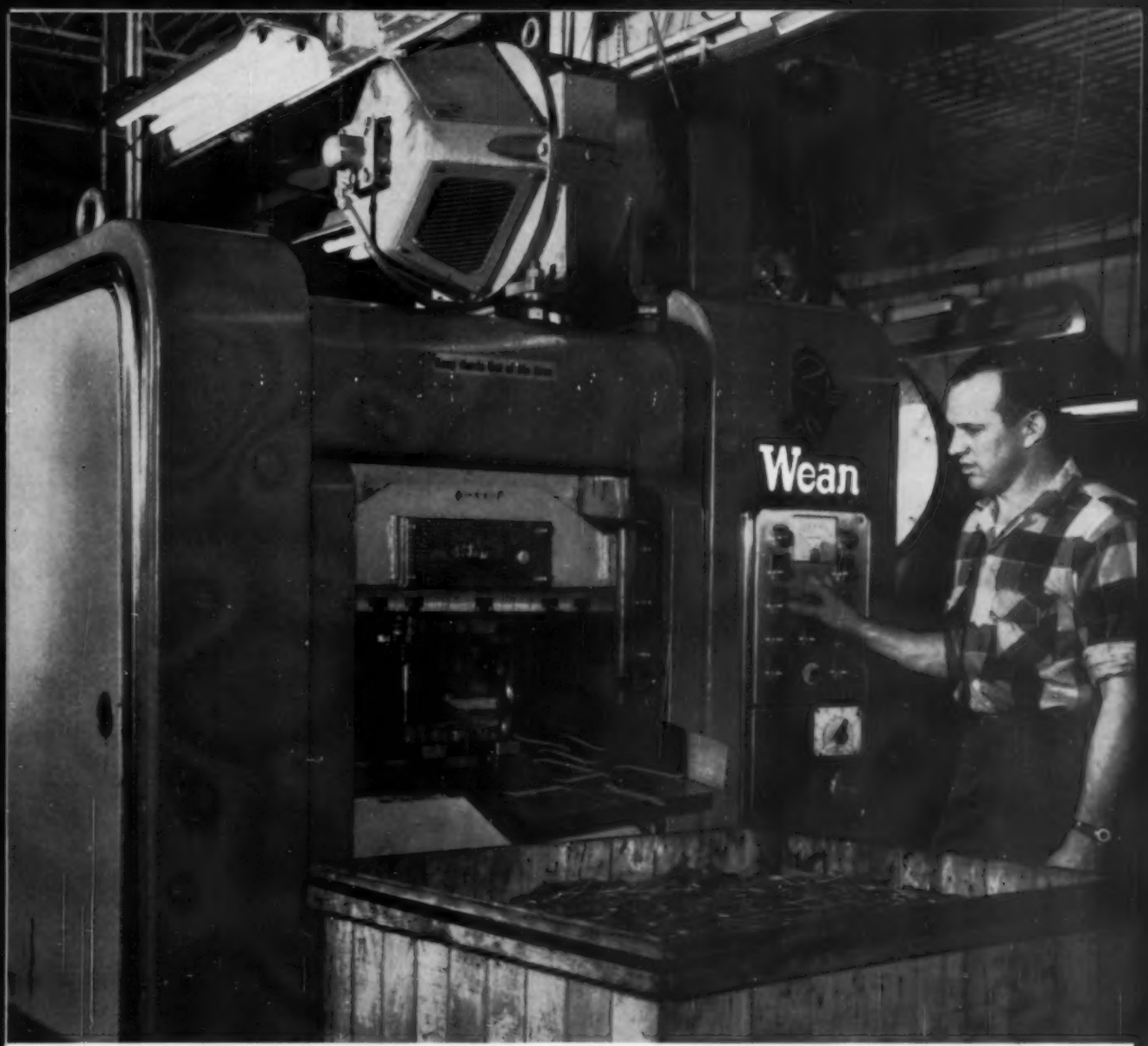

Is the Wean "Flying Press"

the fastest press in the world?

WE THINK IT IS. While our top speeds have stayed around 600 strokes per minute on the "flying press," the size of piece is not restricted to washers and the like which are made on other high speed presses.

For example, where conventional presses rarely can process more than 100 feet of metal per minute, the "flying press" has performed at speeds in excess of 300 feet per minute.

One new model, for instance, blanks automotive assemblies 8 feet long at 45 per minute.

Yet, the "flying press" has other major advantages for you. Despite its revolutionary construction, it requires up to 20% less maintenance than other presses — it has no brake or clutch to wear. And, because of almost perfect dynamic balance, the press can be floor mounted.

We could write a book about the features of the Wean "flying press" — in fact we have. It's soon to be released . . . and it's yours for the asking. Write to the address below. We will mail your copy of the Wean "Flying Press" brochure as soon as it comes from the printers.

Wean Equipment Corporation
CLEVELAND 17, OHIO

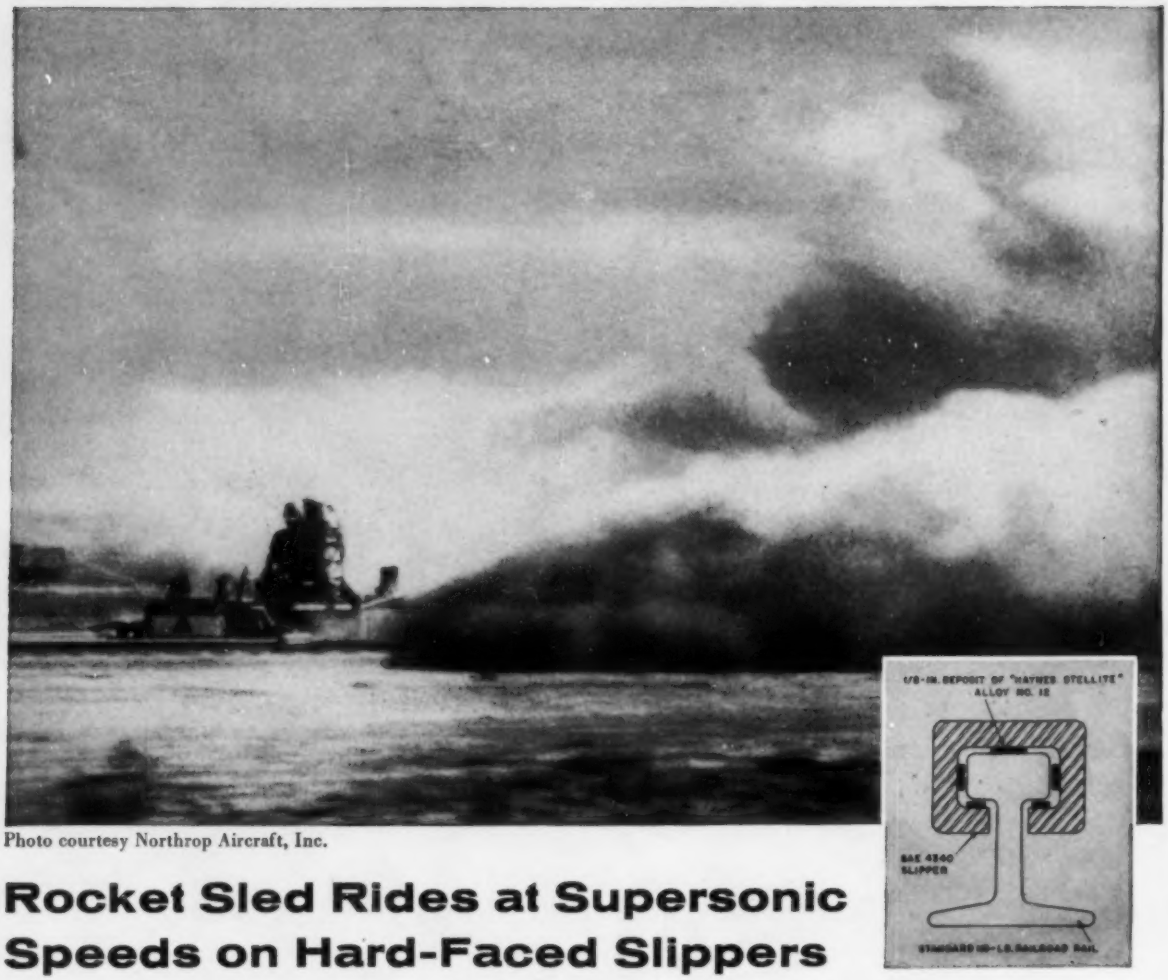

Photo courtesy Northrop Aircraft, Inc.

Rocket Sled Rides at Supersonic Speeds on Hard-Faced Slippers

Four hard-faced slippers bear the entire weight of this rocket-propelled sled as it hurtles down a special railway at more than 900 miles per hour. Hard-facing protects the slippers from abrasion and the tremendous frictional heat generated during each run, and enables them to make 12 trips. Before hard-facing was adopted, the slippers wore rapidly and often had to be replaced after every trip.

As the sketch (above) shows, each slipper is hard-faced at five locations with HAYNES STELLITE alloy No. 12 rod. The cobalt-base alloy is deposited by the metallic-arc method and then finished by machining.

The successful use of HAYNES STELLITE rod on the rocket sled slippers emphasizes several outstanding characteristics of this cobalt-base material. It has exceptional resistance to metal-to-metal wear and frictional heat. It retains its hardness even when exposed to temperatures in the red heat range. In addition, it will withstand the effects of corrosion, erosion, and oxidation, and it has a low coefficient of friction. This combination of properties makes it extremely valuable for protecting such industrial parts as valves, valve seats, bushings, pump shaft sleeves, mandrels, extrusion screws, punches, and dies.

For full information on the complete line of 19 HAYNES hard-facing alloys, designed for every condition of wear, write for the booklet, "HAYNES Alloys Hard-Facing Manual."

HAYNES TRADE-MARK ALLOYS

HAYNES STELLITE COMPANY

A Division of Union Carbide and Carbon Corporation

UCC

General Offices and Works: Kokomo, Indiana

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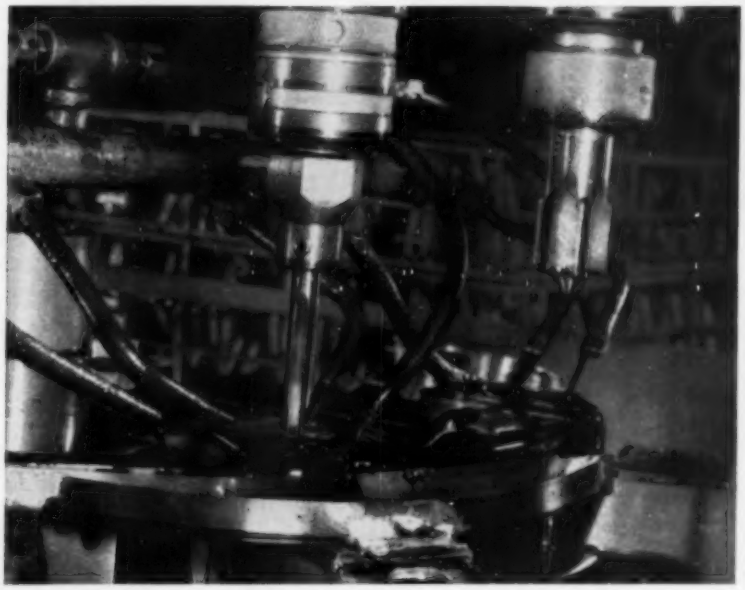
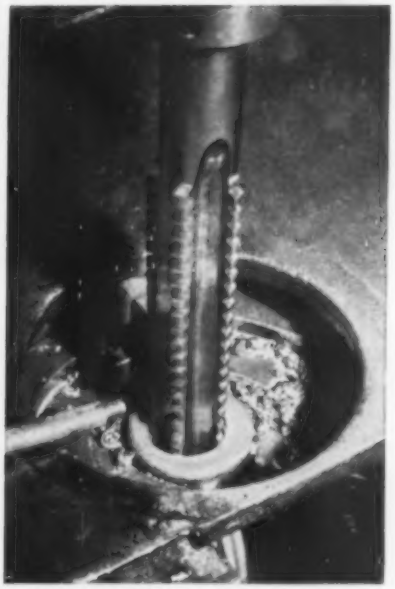
"Haynes" and "Haynes Stellite" are registered trade-marks of Union Carbide and Carbon Corporation.

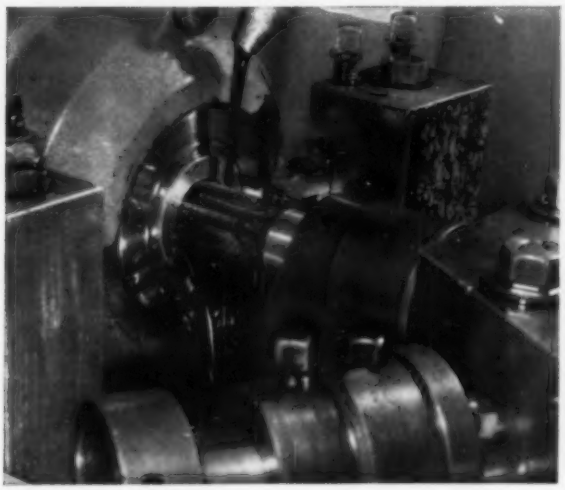
Cutting Tool and Gaging Methods . . . by BESLY



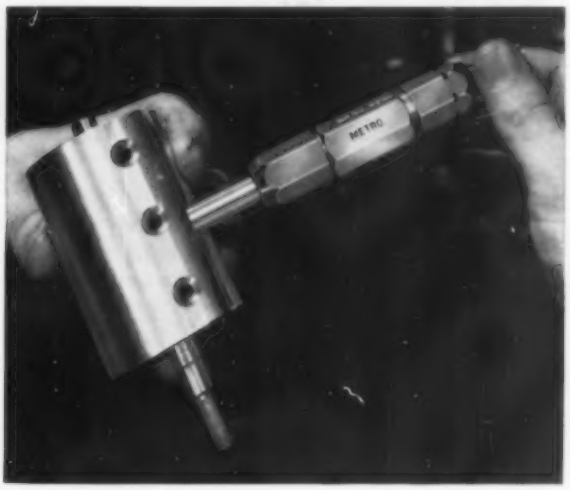
MATCHED TO THE JOB — At The Chicago Screw Company, Bellwood, Illinois, two sizes of Besly taps, poised above an indexing table, are ready to tap C-1141 steel parts. Operating alternately, the smaller 3/8"-24 Besly tap quickly threads a hole, then the work indexes beneath the 1 5/32"-24 Besly tap and a larger hole is threaded. By using Besly's Engineering Service, this company realized lower costs and a better job. The right taps were carefully selected and matched to the specific threading requirements.



SQUARED OFF — Templeton, Kenly & Company, Broadview, Ill. cuts heavy, almost square threads in malleable iron bases of rugged 12 to 24-ton screw jacks with Besly acme threadform Taps. Notice mirror finish on flutes promoting greater chip clearance.



TOUGH GOING — Here you see a C-1018 high carbon steel nut being threaded by a Besly 1 3/4" tap. Extremely abrasive, because it has been carburized and heat treated, the material is difficult to tap. However, Besly taps tested on the work, proved they could "take it" and were specified by this manufacturer for the job.



ASSURED ACCURACY — To assure that holes in planer cutter head assemblies provide precise fits for set screws, SKIL Corporation, Chicago, checks for accuracy with Besly-Metro Double End Reversible Cylindrical Plug Gages. Two opposed blades have three holding set-screws and another for adjusting position.

Prove to yourself that Besly Cutting Tools and Gages produce better results. Put them on trial on your toughest jobs, and check the difference in longer tool life, less down time, fewer rejects and faster production. If you'd like to try Besly tools or use Besly's Engineering Service, see your Besly distributor for details, or write us . . .

Engineering, Service and "Specials". . . are a Besly Specialty

BESLY

BESLY-WELLES
CORPORATION
Est. as C. H. Besly & Co. 1875
134 Dearborn Avenue,
South Beloit, Illinois

TAPS • DRILLS • REAMERS • END MILLS • TOOL BITS • GAGES
CARBIDE TIPPED TOOLS, BLANKS, THROWAWAY INSERTS and HOLDERS

The unique air-blast test device shown above makes possible one of the most accurate accelerated spalling tests in the basic refractories industry.

Following is an example of how Kaiser Chemicals research laboratories use the test to help develop Periclase Chrome brick with stronger bonds, lower thermal expansion and higher conductivity (the three "musts" for spall-resistant brick):

"Whistling Wind" Creates Heat Differential

First, 3″ x 3″ x 6″ samples of pre-fired brick are placed in a furnace and brought up to test temperature.

Next, the samples are removed from the furnace and placed immediately in the test device. Unheated insulating brick cover all sides and the bottom of each hot sample, leaving only one 3″ x 3″ end of each brick exposed.

Then, high-pressure jets of cold air are blown directly onto the exposed ends of the glowing bricks. This "Whistling Wind" air blast shock-chills one end of each brick . . . while the rest of the brick remains red-hot!

Tests Brick's Ability to Resist Spalling

After a measured air-blast cooling period, the bricks are inspected and cracks (if any) recorded. The bricks are then placed in the furnace again to repeat the cycle. A record is kept for each test cycle, and failure is recorded when a brick separates.

Research Lengthens Brick Service Life

This unusual test is just one example of the thoroughness and originality of Kaiser Chemicals Research. From it—and from many other unique tests—come special refractory compositions such as Kaiser Periclase Chrome brick that assure open hearth operators of less spalling, less swelling and greater resistance to alteration by oxides and slags. Good reasons why more and more open hearth operators say:

"Kaiser Periclase Chrome Brick Last Longer"

For this unique spall test, "Whistling Wind" chill-blasts one end of each brick while the rest of the brick remains red-hot.

MORE REASONS WHY KAISER PERICLASE CHROME BRICK GIVES YOU BETTER SERVICE:

1. **Low Chromite Content.** Chromite content is the minimum amount necessary to provide thermal shock resistance, (only 9.1% Cr_2O_3). Lowering of chromite also reduces swelling in presence of iron oxide, thus minimizes buckling and peeling.

2. **Uniform High Strength** because the ceramic bond is formed *BEFORE* the chemical bond burns out.

3. **Outstanding Dimensional Stability** because there is no liquid phase in the conversion from chemical to ceramic bond. Nothing "melts out" to cause distortion or shrinkage.

4. **Excellent Resistance to Chemical Attack** by furnace fumes, iron oxides and slags is assured by high magnesium oxide content, maximum brick density, (low porosity), and chemically stable composition.

Call or write Kaiser Chemicals Division, Dept. S6231, KAISER ALUMINUM & CHEMICAL SALES, INC., at any of the addresses listed below.

PITTSBURGH 22, PA. . . . . 3 Gateway Center
HAMMOND, IND. . . . . 518 Calumet Building
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Kaiser Chemicals

Pioneers in Modern Basic Refractories

REFRACTORY BRICK & RAMMING MATERIALS • CASTABLES & MORTARS
MAGNESITE • PERICLASE • DEADBURNED DOLOMITE • ALUMINAS

...the BIGGEST story on spot welding!

Welding engineers testing record setting spot welder. Federal has been commissioned to build several more of these giants for aircraft manufacture.

Federal Built 14 ft., 28 ton giant goes into operation on west coast . . .

The biggest thing in aircraft spot welding—that's the huge new Federal Three Phase Frequency Converter Spot Welder designed to make spec plus welds on the tail section of a new commercial jet airliner.

More than 13 feet tall, the big welder weighs over 58,000 pounds, and has a special throat, or work clearance area, of some 2500 square inches.

The design and manufacture of the 12 ton unipolar transformer having an output in excess of 100,000 amperes and the requirements of meeting rigid deflection specifications on this large throat machine were just a few of the new problems encountered on this project. Federal experience and facilities once more provided the correct solutions.

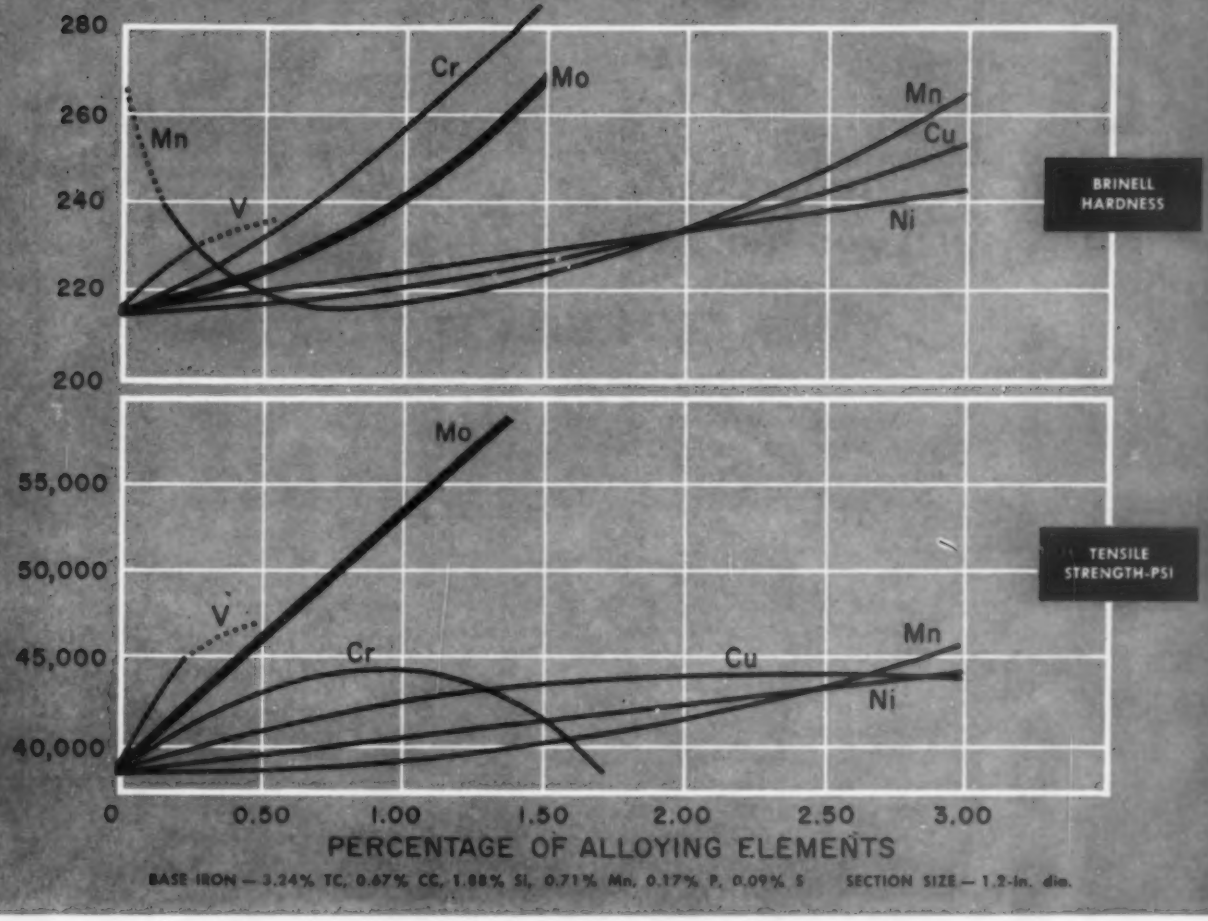
Here again, is proof that large or small—standard or special—*Federal Stays First in Resistance Welding.*

Federal® WELDERS

Warco® PRESSES

The Federal Machine and Welder Co.

WARREN, OHIO



Note how additions of moly, up to 1.5%, produce proportional improvements in strength. And, with moly, hardness increases much more slowly. It means higher strengths can be used with less danger of impaired machinability.

each ½% Moly adds 7000 psi to strength of cast iron...

A little moly adds a lot of strength – for molybdenum increases strength more than any other common alloying element, with the exception of small vanadium additions. A rule of thumb is that fifty points of moly raise tensile strength 7000 psi. And without sacrificing toughness. Actually, moly improves toughness at least as much as strength.

What's more, versatile moly aids in obtaining uniform response to heat treatment . . . and in producing machinable, growth-resistant castings. Moly is easy to use, too.

With most grades of cast iron, moly requires no change in the character of the charge, normal melting practice, or the base metal. And foundrymen like the fact that the small additions necessary may be made at the spout or in the ladle.

Write now for "Why Moly Iron". It's the full story of how and why moly adds strength faster than hardness, how it increases fatigue and torsional strength—in short why moly makes better cast iron. Climax Molybdenum Co., Dept. 3, 500 Fifth Avenue, New York 36, N. Y.

CLIMAX MOLYBDENUM

If you machine parts like these...

we can save you UP TO 30%

...with Ryerson leaded steels

If you machine carbon or alloy steels for production or maintenance applications—you should be able to make substantial savings by switching from a standard steel to a Ryerson *leaded* steel.

We can tell you about customers who produce up to 50% more parts per machine hour, now that they have changed over to a leaded steel recommended by Ryerson. Others report tool life lengthened as much as 300% . . . rejects reduced to all-time lows . . . machine down-time slashed . . . finishing processes eliminated.

The nation's largest stocks of leaded steels in a wide range of types and sizes are ready for quick shipment from Ryerson. (See listing below.) Each is the fastest machining steel of its type available anywhere. If you are not now using leaded steels, it will be worth your while to investigate the possibility of adapting one of them, or several, to your operations.

A Ryerson representative will be glad to work with you. Show you dozens of case histories—good hard facts that document just how well Ryerson leaded steels have worked out under actual shop operating conditions. Call your nearby Ryerson plant.

LEADED STEELS IN STOCK

CARBON STEEL BARS

Ledloy (Screw Steel) . . . Cold drawn rounds, squares, hexagons.

Rycase (Case Hardening, Low Carbon, Manganese) . . . Cold finished rounds.

ALLOY STEEL BARS

Rycut 20 (Low Carbon, Case Hardening) . . . Hot rolled and cold finished rounds.

Rycut 40 (Medium Carbon) . . . Hot rolled and cold finished rounds, annealed to heat treated and stress relieved.

Rycut 47 (Medium Carbon) . . . Hot rolled, annealed rounds.

New Rycut 50 (Medium Carbon) . . . Hot rolled and cold finished rounds in annealed condition, hot rolled rounds heat treated and stress relieved.

Leaded 8620 . . . Rounds hot rolled, cold finished.

Leaded 4140 . . . Rounds, cold finished, annealed or heat treated and stress relieved.

Leaded 8647 . . . Rounds, hot rolled, annealed.

CARBON STEEL PLATES

New E-Z-Cut Plates (Hot rolled, low carbon, manganese.)

RYERSON STEEL

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • WALLINGFORD, CONN. • PHILADELPHIA • CHARLOTTE, N. C. • CINCINNATI CLEVELAND • DETROIT • PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • SPOKANE • SEATTLE

STEEL
January 28, 1957

Metalworking Outlook

Still Expanding

Despite announced delays in the expansion projects of General Electric Co. and General Motors Corp., industry's capital spending program in 1957 will remain high. A STEEL survey of 7500 metalworking executives indicates they expect capacity to rise 5.6 per cent this year; 51.5 per cent of all metalworking plants expect to increase their capacity. Of those, 15 per cent will build new plants, 39.9 per cent will build additions and 82.1 per cent will buy equipment. Delays like those of GE and GM will continue to get wide publicity, but the many more numerous projects that are going ahead tend to be overlooked.

Key for Manganese?

A new key to the development of low grade manganese ores in North America may be provided by Strategic-Udy Metallurgical & Chemical Processes Ltd., subsidiary of Strategic Materials Corp. It has just opened a prototype electric furnace plant at Niagara Falls, Ont. Ore from Strategic's deposits in New Brunswick comprises the feed stock for the prototype plant and will be the raw material for the commercial facility on which construction will soon start near Woodstock, New Brunswick. The prototype unit uses ore with a content of about 11 per cent manganese and 18 per cent iron.

Priorities for Missiles

Washington is giving superpriority authority to makers of long-range missiles to get scarce materials, including nickel and nickel alloys. Orders placed by missile makers can carry the DX rating, giving them first call over the DO rating on regular military and atomic contracts. A supplier receiving a DX order must accept or reject it within five days, giving reasons if it is rejected. If a DX order displaces a DO order on the supplier's schedule, the placer of the DO order must be notified when he can expect delivery on his order.

Scrap Report Due

The Commerce department's survey on the supply of industry scrap (prepared by Battelle Memorial Institute) should be on its way to Congress within the next few days. Don't expect any recommendation to limit scrap exports at this time. Nor will the report be likely to stir any fuss over scrap exports on Capitol Hill. Best guess is that the survey will undergo thorough study before congressional follow-up, if any.

Spur to Steel Homes

Metalworking's stake in the home-building industry looms larger. U.S. Steel Corp.'s U.S. Steel Homes Division has introduced a prefabricated

Technical Outlook—p. 89 Market Outlook—p. 125

unit incorporating 6.5 tons of steel. The metal replaces wood in wall studs, roof framing, gable ends, gutter board, roof overhand sections, windows and interior doors. Wood exterior sheathing and gypsum board interior walls are still used. In both style and price, it promises to compete with other prefabs, as well as conventionally built houses. A 1200 sq-ft, three-bedroom, two-bath dwelling, including lot, carries an $18,135 tag in Harrisburg, Pa. Initial distribution is being limited to the area within 350 miles of Harrisburg.

More German Steel

Look for still more expansion in West Germany's steel capacity. Some 25.7 million net tons of ingots were produced last year, nearly 9 per cent more than in 1956, compared with 14.9 million tons turned out in 1951. One of the newest facilities just opened is a heavy plate mill for Henrichs-Hutte, part of Ruhrstahl A.G.

Boon to Long-Term Contracts?

A decision last week by the Supreme Court should spur the long-term contract, which most management wants. The tribunal ruled that a long-term contract with a reopening clause does not rule out a strike before the full contract expires. A walkout on the reopenable issue is legal, provided 60-day notice is given.

Tool Shipments Climb

Machine tool shipments may hit $900 million-plus this year, compared with $886.4 million in 1956. New orders last year reached $923.9 million. In 1956's fourth quarter, shipments averaged nearly $82.3 million monthly.

Memo to Recruiters

New engineers are receiving average starting salaries of $433 per month, accountants $389 and men with more general backgrounds $385. Average: More than $400 per month, about double what was offered to college graduates ten years ago.

Straws in the Wind

American Supply & Machinery Manufacturers' Association's new order index for December hit 207.5, down 4 per cent from November . . . British unions representing 5 million workers are pressing for pay boosts which would cost $700 million yearly . . . U.S. Steel's Cartier Mining Co. Ltd. will beneficiate 30-per-cent ores in the Mt. Wright area of Quebec; plans call for initial mining of 10 million to 12 million tons annually . . . American Motors Corp. has a unique merchandising plan whereby Ramblers are sold to big home builders at fleet prices. They then offer them to prospective house buyers at less than $1000.

THIS is No Ordinary Power Hack Saw Blade

This is the *unbreakable* MARVEL High-Speed-Edge Hack Saw Blade—the first bi-metal blade—invented, developed and introduced by MARVEL. This blade is a combination of two materials best suited to the requirements of an efficient hack saw blade . . . a narrow high speed steel cutting edge permanently welded to a tough, non-brittle alloy steel body. Each blade is triple tempered to assure long life and maximum toughness to the cutting edge. Development of this high-speed-edge blade made it possible to cut any kind of material from the free machining steels to the toughest of alloys, fast, accurately and economically. Just one type blade to handle any job — no switching blades to cut different materials. Like all good things, attempted copies of this blade have been numerous, but its performance has been *unequalled* by any of the imitators.

The MARVEL high-speed-edge hack saw blade can be tensioned from 200% to 300% tauter than any ordinary hack saw blade, a definite advantage which permits heavier feed pressures to be used without deflection or fear of breakage.

An extremely rugged cutting tool, this one type blade, the MARVEL High-Speed-Edge Hack Saw Blade, will cut any machineable metal with outstanding economy, accuracy, long life and complete safety—*it is unbreakable.*

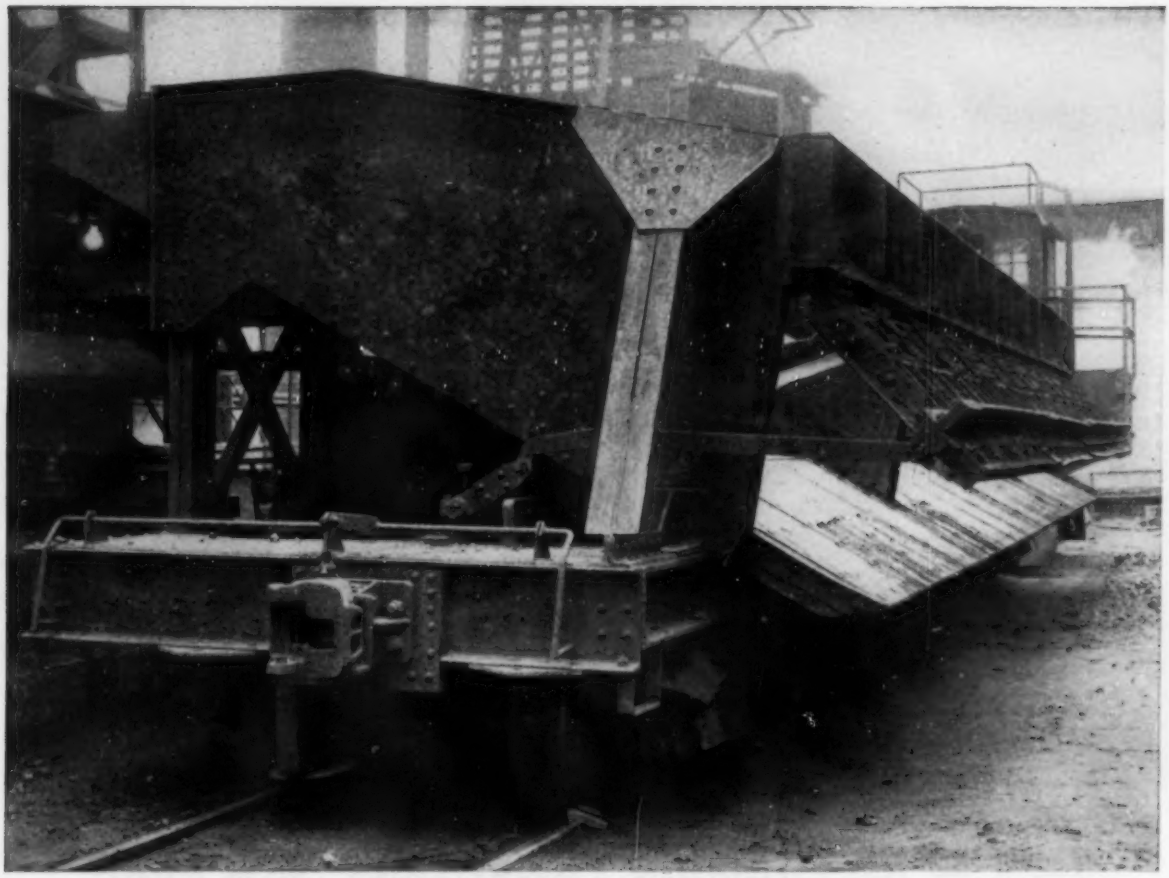
Ask for MARVEL Blades by name and you can be sure you're getting the best on the market. Leading Industrial Distributors have them in stock.

B-1120

Write for latest cutting tool Bulletin and the name of your nearest MARVEL Distributor

MARVEL Metal Cutting SAWS
Better Machines · Better Blades

ARMSTRONG-BLUM MFG. CO. 5700 W. Bloomingdale Ave., CHICAGO 39, U.S.A.



Coke quenching car, Youngstown Sheet and Tube Co., Youngstown, Ohio. Ductile iron plates, doors, diaphragms, and door hinge brackets have greatly extended the service life and reduced maintenance costs on cars of this type. The castings were held in place with rivets of "Yoloy", a nickel-copper steel produced by Youngstown.

Service life extended...

Hopper car survives coke quenching ordeal five times longer with Ductile Iron

This hopper car is on a sizzle cycle at the Brier Hill coke plant of Youngstown Sheet and Tube.

It totes 9 ton loads of 2000°F. coke from oven to cooling tower for water spray quenching. Round the clock. Seven days a week.

Despite these punishing abrasive and oxidizing conditions, ductile iron end and back plates, fastened with Yoloy steel rivets, were still serviceable after 18 months' service. *That's nearly five times the life of 1½" boiler steel plates previously used.* No warping. No cracking. Limited scaling.

A second comparative test – this time on the hopper doors – showed ductile iron lasted three times longer than gray iron. Result: Youngstown now standardizes on ductile iron for all parts that come in contact with hot coke.

Maybe ductile iron is the answer to your hot application problem, too. At high temperatures, it offers excellent resistance to growth, warpage and oxidation. It's strong and tough. Combines many advantages of both steel and cast iron. Proven successful for furnace doors, grates, pouring troughs and the like.

Want to know more about this new material? Write for "Ductile Iron, The Cast Iron THAT CAN BE BENT." Gives full particulars on Heat Resistant Ductile Iron and the entire Ductile Iron family.

DUCTILE D IRON **ductile iron . . . the cast iron that can be twisted and bent**

The INTERNATIONAL NICKEL COMPANY, Inc.
67 Wall Street, New York 5, N. Y.

The Big Squeeze

As we approach the end of January there is every indication that 1957 will live up to earlier expectations as another record year for business.

There also are many indications that 1957 may be a year of contradictions.

True, for the nation as a whole, there is tangible prosperity. Contributing to it are the expanding needs arising from a growth of nearly 18 million in population in the last six years; deficiencies in housing and consumer durable goods caused by the war; the rapid growth of new industries, such as electronics and atomics; and the continuing heavy expenditures for defense.

But the man on the street and individual companies are being squeezed in many ways.

To the man on the street, the squeeze is apparent in the higher prices he must pay for the things he needs; in the difficulty in finding mortgage money, which costs more; and in the big bite that taxes continue to take out of his pay check.

To the individual company, it is apparent in wage costs with escalator clauses as built-in inflation factors; in lower productivity; in higher prices for materials; in borrowing money for inventory or expansion that is more expensive and harder to get; in higher sales and distribution costs; and in slipping profits.

It is not at all surprising that the man in the street and companies are becoming increasingly price, design and quality conscious. This trend is expressed by a number of diverse incidents such as: Price cutting, the furloughing of workers and the elimination of weaker companies in the home appliance industry; the relative popularity of the 1957 automobiles which combine pleasing appearance with good performance; and cautious buying of industrial materials, products and equipment.

We are in a period when the buyer has taken over the initiative long held by the seller. It is a period in which there no longer is a scramble for products regardless of their price or quality.

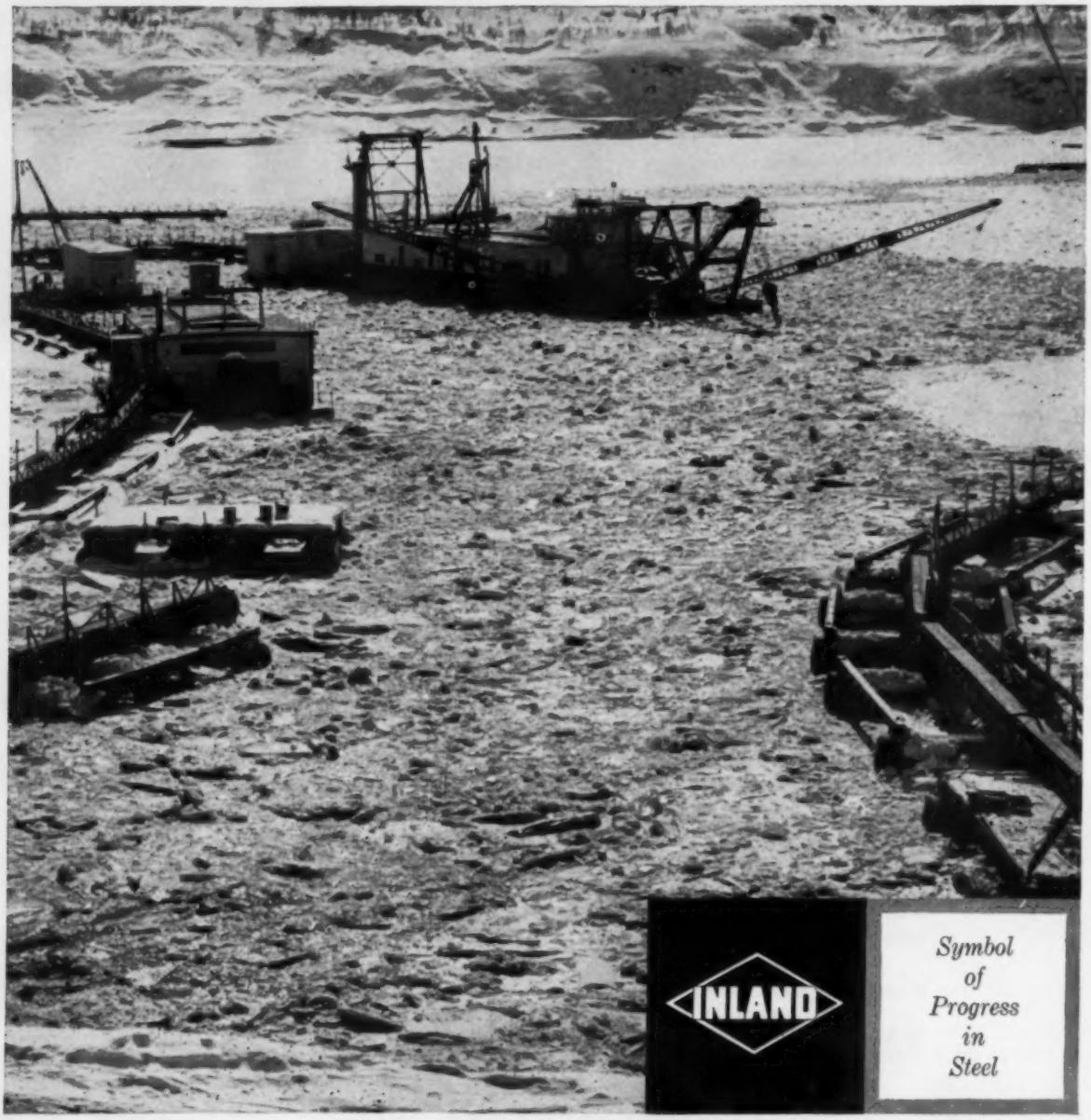
It is a period in which management must make sure that it is making products that will continue to sell; that it is making them by the best methods; that its distribution channels are not clogged by outmoded selling practices; that its costs and prices are in line.

Nowhere is there evidence of a depression complex, but the big squeeze is on!

Irwin H. Such
EDITOR-IN-CHIEF

How are things in Atikokan?

Up in the wilderness of western Ontario, men are working around the clock, through sub-zero weather to dredge away 180,000,000 cubic yards of clay and silt from the bottom of a 700-aere lake. For underneath Steep Rock Lake, near the town of Atikokan, Inland has proved up a vast body of rich iron ore; enough to supply 3,000,000 tons each year when the new mine is in full production. Payoff: an additional source of an essential raw material to satisfy the needs of Inland Steel users for many years to come.



INLAND STEEL COMPANY • 38 South Dearborn Street • Chicago 3, Illinois

Average Wage Boost in '57: One of the Highest?

1953-1956: Associated Industries of Cleveland.
1957: Estimated by STEEL.

Trends in Labor for '57

THIS IS billed as the "quiet year" in labor negotiations, but wage gains in 1957 for metalworkers may average 8 cents per hour, one of the highest boosts in five years (see the chart).

Much of the increase will be accounted for by automatic pay boosts coming because of multi-year contracts. Steelworkers, for example, get an average of 9.3 cents per hour on July 1, plus cost-of-living adjustments. Auto workers and farm equipment employees get a 2.5 per cent increase, plus escalation, as a result of contracts negotiated in 1955.

Automatic—The Labor department estimates that about 5 million workers will get automatic wage hikes this year from some 550 contracts that grant deferred boosts. The over-all average: About 7 cents per hour. Metalworkers' average: About 7.5 to 8 cents per hour.

For the small and medium-sized company which must negotiate this year, look for 7 to 8 cents per hour as the wage settlement. Bigger firms will grant more, to put the weighted average increase between 8 and 9 cents per hour. Figure that in with the automatic hikes, and you get a weighted average of about 8 cents.

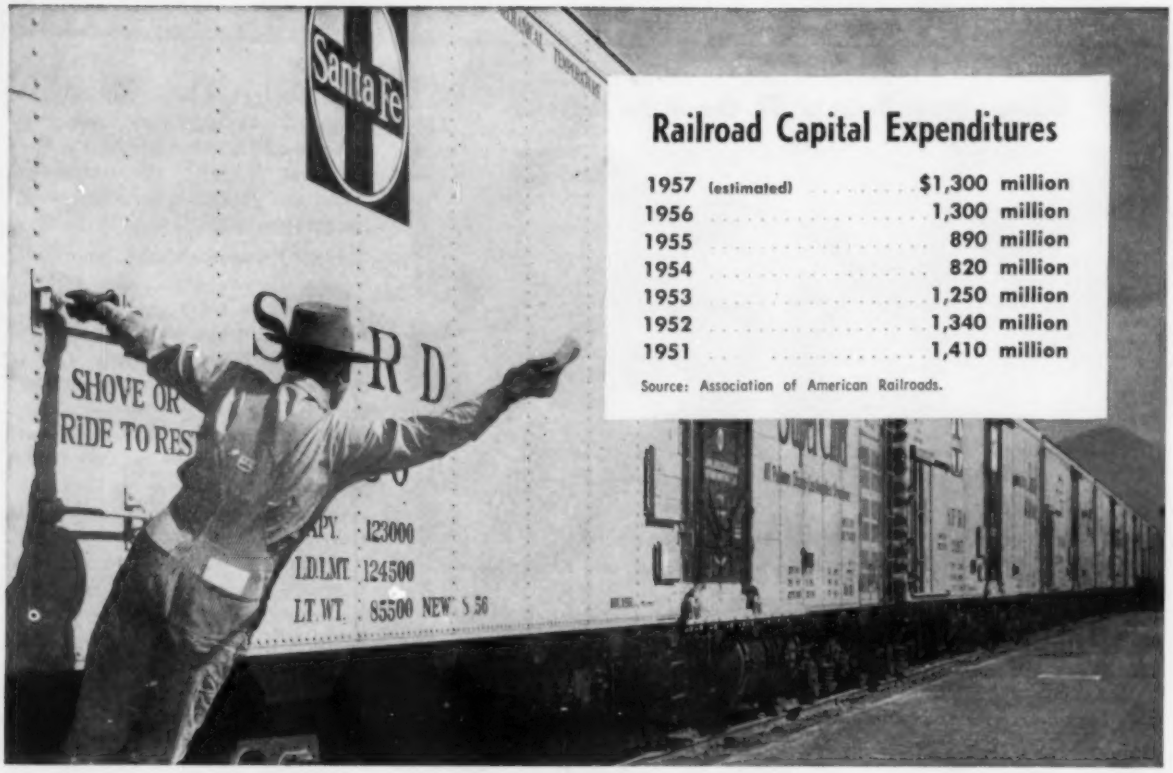
Plus Fringes—Many labor observers believe that 1957 will be characterized from the negotiating standpoint by emphasis on fringes. "With personal income rising, people are becoming more income-tax conscious," points out Associated Industries of Cleveland, which keeps an eye on labor and personnel matters in northeastern Ohio, often considered the barometer area of the nation because of its industrial mix.

The most commonly heard uncommon fringe demand for '57 will be for catastrophic insurance. But for the most part, the fringes demanded will be the old stand-bys —new or better pension plans, more social insurance, another holiday, longer vacations. Unions will demand escalator clauses, too, and have the best chance of getting them from the larger companies, the poorest chance from the smaller firms.

Management Demands — The management side will have its demands, too. Industry men will insist usually on multiyear contracts and more favorable seniority rules. Look for two and three-year settlements to be common in '57. Companies tied to the steel industry may have to agree to two-year contracts that will expire a little after June 30, 1959, when the steel agreement ends. But many other firms can probably win three-year contracts. On this matter, the ice was cracked in 1955 and broken completely in 1956. In seniority, watch for management to fight plant-wide rules and to seek less restrictive arrangements.

Most of the major contracts of interest to metalworking that expire this year (almost all in February and March) involve the aircraft and rubber industries.

Loss Time—Look for fewer stoppages, less workers involved in '57 than in '56. Last year was the second best in 14 when 3800 strikes involved 1.9 million people.



Railroad Capital Expenditures

1957 (estimated)	$1,300 million
1956	1,300 million
1955	890 million
1954	820 million
1953	1,250 million
1952	1,340 million
1951	1,410 million

Source: Association of American Railroads.

Highball for Railroads

LAST YEAR, American railroads spent about $1.3 billion on additions and betterments to plant and equipment; the roads will spend as much this year. Since the end of World War II, their total capital expenditures have exceeded $12 billion.

The large expenditures were made even though increased operating expenses and taxes more than offset gains in operating revenues. The net income of Class I railroads in 1956 ($875 million) was 5.6 per cent less than the 1955 figure, and the rate of return on net investment declined from 4.22 to 3.95 per cent.

Revenues Rise—Total operating revenues last year, according to William T. Faricy, president of the Association of American Railroads, were estimated at $10.6 billion. Of this, freight accounted for $8995 million, an increase of 5.4 per cent over the 1955 mark; passenger traffic brought in $755 million, an increase of 1.6 per cent; other revenues came to $850 million, a gain of 3 per cent. But total operating expenses in 1956 were $8155 million, an increase of $509 million. Taxes paid by the railroads in 1956 will aggregate $1130 million, an increase of 4.6 per cent.

The increase in freight traffic revenue last year was the first since 1952, and the downward trend in passenger traffic revenue was arrested.

Rail freight traffic in 1956 was the second highest on record, topping 1955 by 0.5 per cent, according to AAR. Carloadings last year totaled 37,841,969, or 205,938 more than in the preceding year. The record was 38,215,993 in 1953. A record in 1957 is a possibility.

Freight Cars—Of total expenditures for plant and equipment in 1956, a third or more went toward expanding and improving the freight car fleet. An estimated 55,000 new cars were placed in operation during the year. The railroads enter the new year with orders on the books for approximately 110,000 new freight cars, costing nearly $900 million.

Freight car buying and construction in 1957 are likely to be limited by steel availability. The probability is that during the next three years carriers won't be able to acquire as many cars as they would like to.

Tank Cars—Tank cars will continue in short supply this year. At the end of 1956, according to Harry J. Leddy, president, Shippers Car Line Division, ACF Industries Inc., the number of privately owned tank cars in service was estimated at 153,000, vs. 151,935 in 1955. About 6000 were delivered in 1956. Despite the steel shortage, deliveries to private com-

panies this year should reach 6500.

D. B. Jenks, president, Rock Island Railroad, says that the railroads should agree on a standard design of freight cars so they can be built more cheaply on a mass production basis. In 1940, Mr. Jenks points out, diesel locomotives cost $117 per horsepower but through standardization this was reduced to $105 in 1955. In 1940 a steel boxcar cost $0.67 a cubic foot and $1.51 in 1955.

Locomotives—Class I railroads installed 1221 new locomotive units in the first ten months of 1956, compared with 894 in the 1955 period. New locomotives on order Nov. 1 totaled 728, compared with 876 on the same date a year ago.

A number of railroads began running new lightweight passenger trains last year to cut passenger losses. But it appears that these trains are still too experimental to provide a sure solution.

Rates Up—Some assurance that railroads will be able to maintain 1957 expenditures for additions and betterments to plant and equipment at the 1956 rate comes from the fact that the Interstate Commerce Commission recently approved higher freight rates and passenger fares. But carriers maintain the increases are inadequate to meet their rising costs, and reaffirm their intent to obtain further boosts.

Railroads have been seeking a 22 per cent increase in freight rates. In December, ICC granted emergency advances of 7 per cent to eastern and 5 per cent to western roads—they are expected to provide about $406 million a year in additional revenue. Carriers will press for the full 22 per cent. The last previous freight rate boost (6 per cent) went through last March—the first general increase since World War II.

Profit Squeeze—Fred G. Gurley, president, Santa Fe Lines, looks for a continuing high level of business in 1957. But despite the good revenue outlook, he indicates that the income of many railroads will continue to be in a squeeze because of continuing increases in wages, fuel and other costs.

Basing its views on rising population and industrial production, the Railway Progress Institute foresees a 38 per cent increase in freight operations by 1965. Even passenger travel will stop its decline by 1960 and climb above the present level by 1965. One big advantage the railroads have over airplanes and highway haulers, it is pointed out, is the "built-in" potential of their track network. Railroad tracks can carry three to five times as much traffic as they do now. Any increase in truck and air traffic would require huge investments in highway and airport facilities.

Electronic Future—The future will see railroads spending more money for electronic equipment used in the operation of freight and passenger trains as well as their freight yards.

The New York Central, for example, has announced it soon will begin construction of two new electronic freight yards at Elkhart, Ind., and Youngstown at a cost of $21 million. They will be finished late this year or early in 1958. Television and weather penetration radar speed controls will be included in the electronic devices. Nearing completion at Buffalo is a $10.6-million electronic yard.

Controls in 1963—On Jan. 16, this year, at Erie, Pa., New York Central activated a $6,238,460 electric control system for 163 miles of double main line track between Cleveland and Buffalo. By 1963, the railroad's entire main line between New York and Chicago will be under electric control.

Many other railroads are planning big modernization and equipment programs this year. The Chesapeake & Ohio, for example, says its capital expenditures will soar to a new high of more than $125 million, up from a record $90 million in 1956. The Northern Pacific plans to spend $30 million in 1957 for new equipment and improvements. The Pennsylvania is placing a $1.5-million order for six new commuter-type coaches from the Budd Co. and is taking an option on 44 more. The cost of the 50 units is about $9 million.

Builders' Prospects — For the manufacturers of railroad rolling stock, the prospects are encouraging. Baldwin-Lima-Hamilton Corp. sees the 1957 outlook as pretty good, with bookings holding up well. The Electro-Motive Division of General Motors Corp. delivered 50 per cent more locomotives to domestic users in 1956 than it did in 1955. Export business was 60 per cent greater. "Remanufacture" of older diesels, a new facet of that company's business, was up 70 per cent. The division is expanding its facilities.

Budd Co. reports its sales of passenger cars in 1956 aggregated around $20 million, and the backlog of passenger cars already on the books is sufficient to occupy its shops for nine or ten months this year.

Looking Ahead

Electric power will figure heavily in the next 20 years' growth of U.S. industry

TELEVISED telephone conversations are only two or three years away. By 1976, almost all U.S. factories will be air conditioned. Disposable income will more than double in the next two decades, while the population will increase by 35 per cent. Use of electric power will go up 400 per cent.

So learned those attending a forum sponsored by General Electric Co. and Public Service Electric & Gas Co. of New Jersey.

Be Prepared—To get ready for that fabulous future of ours, says Harold A. Olson, GE's commercial vice president, we must give more time to long range planning, and keep looking farther ahead. "Perhaps our conventional planning period should be 15 to 20 years."

Every industrial manager's job: To take time for long range planning.

Productivity—Fred W. McChesney, manager, light manufacturing industries sales development, GE, pays respect to electricity's part in this country's growth. In 1929, each worker annually used 6855 kw-hr of electricity; today he uses about 21,000. Look for a hike to 36,000 by 1966; to 61,300 by 1976.

The Federal Reserve Board's production index now stands at 142. By 1966, it will hit 201; by 1976, 281. That rise will be accomplished while the average man is working less hours per week, and with little growth of the labor force.

Piping Lake Erie to Industry

The engineers say: It's needed
It's economically feasible
It can be financed

WATER, WATER everywhere?

Industry knows differently. Even in northern Ohio, more blessed than many areas with the fluid vital to most manufacturers, planners see water's availability as the limiting factor to future expansion. Hence, a unique plan to pipe Lake Erie to industry.

Engineering Study — One step has just been accomplished—completion of a year-long study to determine the feasibility of using water from the lake to supplement present supplies.

For years, a water-conscious Clevelander, John H. Byrne (his photo is on page 6), has been urging northern Ohio to do something about increasing its water supply to meet the coming needs. Through his efforts came the formation of the Lake Erie Watershed Conservation Foundation of which he is executive director.

A Start—The foundation, headquartered in Cleveland, solicited enough money to make a start on engineering surveys of the feasibility of piping Lake Erie water inland. The first survey, just completed, takes in only part of the area that is a potential beneficiary of the proposed water pipelines. Covered are eight northeastern Ohio counties in the Cleveland-Akron area. The survey was made by the Stanley Engineering Co., Muscatine, Iowa.

Conclusion No. 1 — The survey finds it will be necessary to pipe water inland from Lake Erie to the eight counties — Ashtabula, Cuyahoga, Geauga, Lake, Lorain, Medina, Portage and Summit. Foreseen is a 1980 population that will be 60 per cent larger than that of 1950. By 2000, the population will be 125 per cent above 1950.

The eight counties, with only one-twelfth of the state's area, have more than a third of the state's population. Industrial and urban growth will spill out into lands now rural. The automobile industry is already building a cluster of plants in this area (see STEEL, Jan. 21, p. 49).

Running Out—But there won't be enough water from present sources (rivers and wells) to supply the expected growth. By 1980, the deficiency will amount to 1150 million gallons a day. (This equals 90 per cent of present usage.) By 2000, the shortage will be 2700 million gallons a day.

The shortage will be felt as early as 1959, the report says.

The solution of the problem is to pipe and pump water from Lake Erie.

Giant Reservoir—Lake Erie is an almost limitless supply of high-grade water. The engineering report points out that Lake Erie receives a large flow from the three upper Great Lakes (Michigan, Superior and Huron) as well as the direct inflow from its tributary streams. These four lakes acting together operate like a large regulating reservoir with a nearly constant rate of outflow.

Average annual outflow from Lake Erie is 125,000 million gallons a day, or about 100 times the amount presently used in the 3100-square-mile area in the study. Normal anticipated withdrawals from the lake would have little effect on the total lake supply.

High Quality — Lake water is relatively soft in contrast to water from wells and surface streams. Total hardness of Lake Erie water averages about 125 parts per million. Ohio streams tributary to Lake Erie range in hardness from 150 to 280 parts per million, while well waters range generally from 200 parts per million upward.

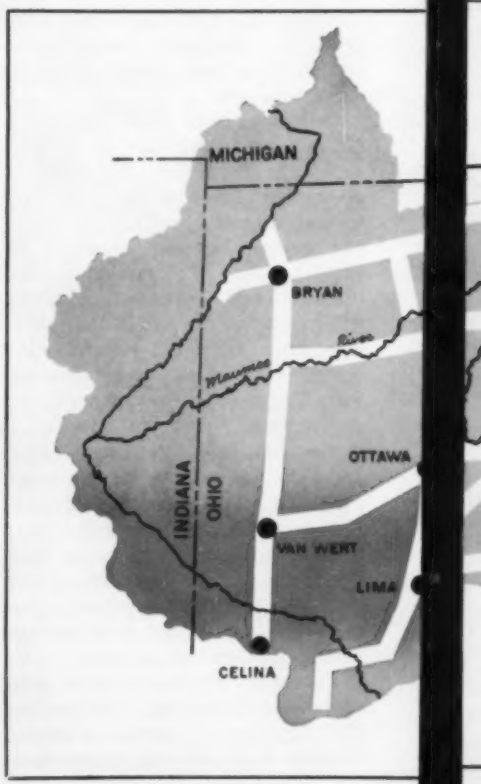
Lake Erie water is relatively cold. Its maximum summer temperature is about 75° whereas natural surface streams rise to 88°F.

Conclusion No. 2—Piping of water from Lake Erie is economically feasible, the survey declares. The work could be done in stages. Based on today's rates, the first stage in the eight-county area would cost $56,150,000. Four succeeding stages would hike the total to $200,520,000. These projects would supply water to an area lying more than 10 miles south of Lake Erie. The 10-mile strip is already served fairly well by water systems. The proposed system of pipelines would be limited to the Lake Erie watershed—the northern third of Ohio. A treaty between the U.S. and Canada says that water taken from Lake Erie must be allowed to flow back into it.

Three Lines — The engineering report maps out three pipelines for the eight counties (see the map).

The water probably would not be treated. This, if necessary, would be done when it reaches its destination.

The lines would supply water several ways. Along their routes, they would be tapped into by towns and industries. Some of the water would go into terminal reservoirs, and some of it would pour directly into creeks and rivers to serve



other communities and plants. Practically all the water ultimately would end up going down rivers emptying into Lake Erie. The water flowing downstream would again serve towns and plants along them.

Area 1—One line would start at Avon Lake (10 miles east of Lorain) and run southerly and southeasterly about 35 miles. The first several miles of pipe would be 72 in. in diameter.

Area 2—Another line would be in the vicinity of Cleveland, although four possible routes are explored. The problem there is to get the line through congested areas with the lowest possible cost. Two of the routes are via pipeline and two include tunnels through the congested area. The aim would be to supply an area as far south as Akron, about 35 miles from the lake. If pipelines were used from the lake southward, they would be 78 in. in diameter. If the north portion of the lines were tunnels, they would be either 124 or 171 in. in diameter.

Area 3—The third line would be at Ashtabula and would start with 48 and 60 in. pipes. The line would would run south about 25 miles.

In each of the three areas, the lines would be more than just one main pipe. Auxiliary lines would branch from the main line, and in some cases the auxiliary lines would not tie directly into the main line but would be separate units.

At the Lake—Intakes in Lake Erie will be submerged crib-type structures about 2 miles offshore, at sufficient distance to obtain proper depth for navigation clearance and protection against ice. Their probable depth will be 40 ft.

The conduit extending from the intake to the pumping station will be buried in a trench in the lake bottom. Pumping stations will be equipped with screens and electrically driven centrifugal pumps. Multiple pumps will be provided for flexibility in meeting demands.

Steel or Concrete—Pipelines will be steel or reinforced concrete sized in accordance with anticipated capacities needed to provide economical service.

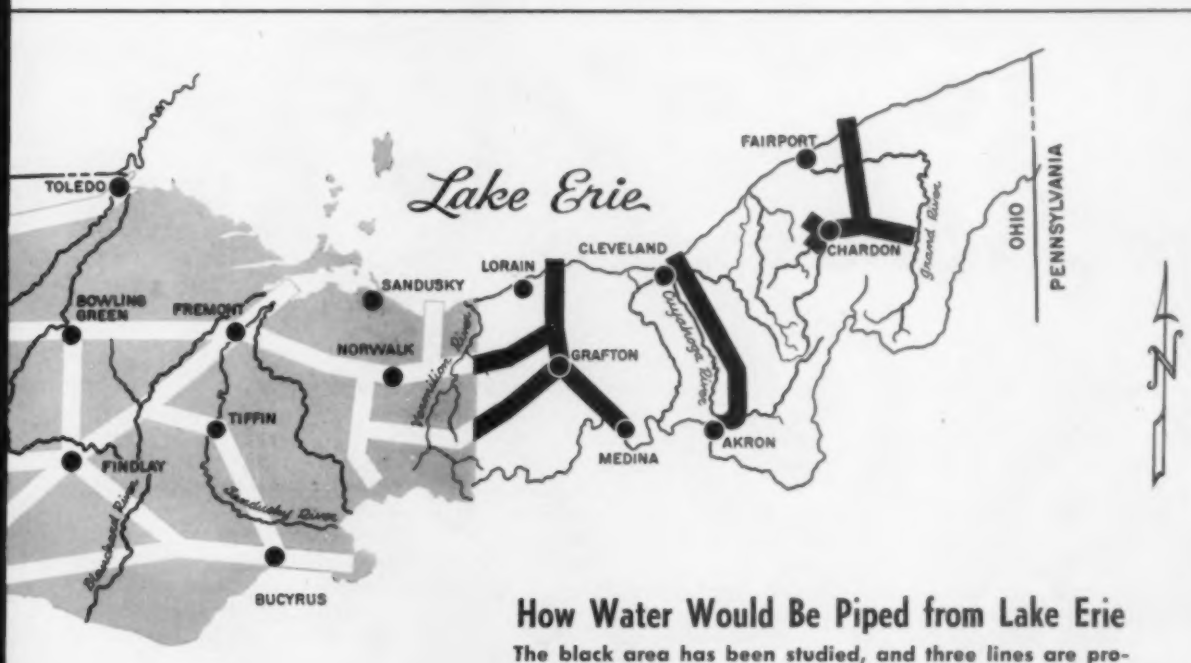
Terminal reservoirs will be open type formed by compacted earth embankments.

The report finds the cost of supplying Lake Erie water to inland areas to be reasonable and about in line with water prices in some areas of the country today. Total cost of water to the user would range from $150 to $225 per million gallons, the report says.

Conclusion No. 3—Many different methods or combinations of methods of financing could be used, the report suggests. Because construction would be in stages, the task of paying for it would spread over a number of years rather than fall into a short period.

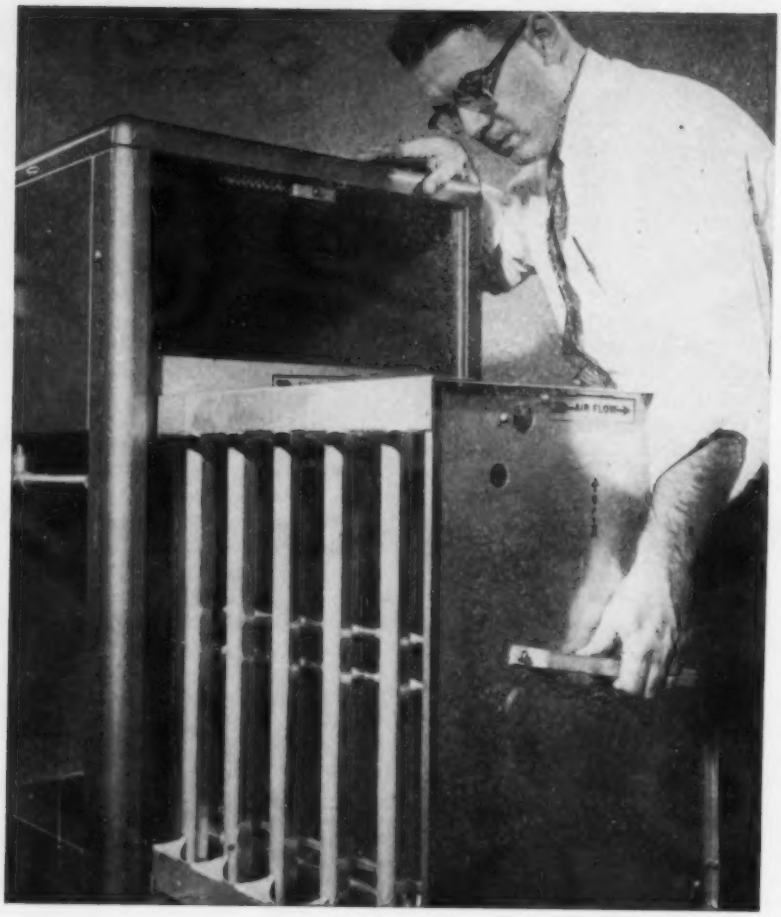
Next Move—Before the project can be launched, there will have to be some enabling enactments from the Ohio legislature. For one thing, laws would have to be written to allow the establishment of water districts in the eight-county area. The districts would cut across all present political lines.

Work with the legislature will start with the one now in session.



How Water Would Be Piped from Lake Erie

The black area has been studied, and three lines are proposed. The green area has not been studied but possible routes for lines are shown.



To develop markets for this electronic air cleaning unit . . .

Trion Invites Competition

HOW CAN a small firm build a $4-million industry into a $90-million giant?

Advises Trion Inc.'s president, E. W. Meyers Jr.: "Get the help of a big corporation with a history of aggressive salesmanship."

He predicts: "Electronic air cleaning will expand into a $90-million business annually if only one-third of the commercial air conditioning plants and 10 per cent of the homes are equipped with electronic air cleaners by 1962."

Circumstances — Trion produces electronic air cleaning equipment at its Pittsburgh plant. The product competes with lower priced mechanical devices, but company officials believe electronic equipment removes air-borne particles which mechanical equipment can't touch. The firm's problems: Tell this to the buying public and convince the general public of the value of clean air.

"We have about 33 per cent of a $4-million annual market. We would prefer to have 10 per cent of a $90-million market," Mr. Meyers declares. "To build electronic air cleaning equipment sales to that volume, the industry had to have a new producer."

His Solution—Mr. Meyers' company got together with Minneapolis-Honeywell Regulator Co., Minneapolis, to help that firm begin the manufacture of electronic air cleaning equipment.

Trion signed an agreement on July 1, 1956. "We liked Minneapolis-Honeywell because of its fine reputation for aggressive merchandising," Mr. Meyers explains. "We will benefit from a broader market and from co-operative research and engineering agreements."

The Pact—Under terms of the agreement, Trion will furnish Minneapolis-Honeywell with existing and pending patents and furnish drawings and technical knowledge in return for royalties and fees. The agreement provides for the full exchange of research and engineering information. Minneapolis-Honeywell will exchange patents with Trion for the next 20 years, royalty-free.

Lower Cost—Minneapolis-Honeywell has nearly 75 years of experience in the design, production and sale of control equipment for heating and air conditioning devices which go into homes and commercial buildings. John Haines, vice president, believes that this experience can lead to substantial reductions in the cost of air cleaning equipment.

The company is beginning a research and engineering program to improve equipment for commercial buildings. Mr. Haines reports his company sees these sales potentials for the 1962 market: Commercial buildings, $70 million; home sales, $20 million.

Public Education — Minneapolis-Honeywell's salesmen will use the company's resources to publicize the value of clean air. They say owners of office buildings spend 57 cents per square foot per year to keep rooms clean. Air-cleaning equipment in the home will reduce cleaning and housekeeping costs.

Service — Honeywell's staff of sales engineers can solve complex problems in controlling heating, ventilation and air conditioning. Design, service and installation will be provided through its offices in 125 cities.

The company will begin to market electronic air cleaning equipment in February.

Gas Appliance Market Up

GAMA predicts ranges, incinerators and dryers will show huge increases in total shipments over previous year; gas gains as country's home heating fuel

TOTAL FACTORY shipments of gas appliances and equipment will show an over-all gain of 1.2 per cent when compared with 1956 results, predicts the Gas Appliance Manufacturers' Association, New York.

Estimated front runners: Domestic gas ranges, with a 25.3 per cent gain over 1956 shipments; gas incinerators, a 28.1 per cent rise; clothes dryers, a 21.5 per cent increase.

Run Down — Reports GAMA: "During 1956, gas replaced oil as America's leading home heating fuel. This was done even though manufacturers of gas-fired central heating equipment recorded sales somewhat lower than 1955's." Central heating forecast: Unit shipments will be slightly above last year's results (see table). Industry forecasts estimate that by 1960 there will be 21 million homes using gas for heating (central and space type), an increase of 4 million over 1956 totals. This excludes some 8.1 million homes using LP gas.

Water Heaters—Industry shipments reached a new high in 1956 and should establish another record in 1957. Automatic gas water heaters under 40 gallons will show a decline as more homeowners turn to the larger capacity gas-fired units.

Ranges—Domestic producers of gas ranges will ship over 2 million units (free standing and built-ins) for the eleventh consecutive year. Commercial cooking equipment makers look for a 10 per cent gain in shipments during the coming year.

More Gas—Gas appliance forecasts are heavily influenced by the progress being made in developing additional natural gas pipelines. At the end of last year, some 517,000 miles of gas pipeline had been put in operation. U.S. gas utilities are serving 30,139,900 customers—27,788,800 of the total are residential users. The gas industry had a record year in all respects during 1956. Gas utility customers, sales revenues and expenditures for extending service reached all-time peaks, reports GAMA.

Future—The American Gas Association predicts that by 1960 there will be 33 million gas utility customers. About 31 million of this total will be residential users. And predicts AGA: In 1965 there will be 38.25 million gas utility users (35.3 million residential users).

Outlook: The gas utility industry hopes to add 1 million customers a year through 1965.

Banner Year Ahead for Gas Appliances

(Unit Shipments)

	1957*	1956†	1955
Domestic ranges			
Free standing	2,027,000	2,019,000	2,266,600
Built-ins	200,400	160,000	100,000
Totals	2,227,400	2,179,000	2,366,600
Automatic water heaters			
Under 40 gal	2,069,000	2,143,000	2,079,900
40 gal and above	775,000	692,000	668,300
Totals	2,844,000	2,835,000	2,748,200
Central heating equipment	1,149,000	1,092,900	1,135,000
Direct heating equipment	1,731,000	1,700,000	1,469,700
Clothes dryers	571,000	470,000	365,000

Source: Gas Appliance Manufacturers Association.
†Figures for 1956 include actual shipments for ten months, GAMA estimates for two months.
*Estimated.

Five-Year Plate Shortage?

Members of the Steel Plate Fabricators Association, who met in Chicago last week, believe that the shortage of heavy plates will be a continuing problem for five years.

Charles L. Huston Jr., president, Lukens Steel Co., Coatesville, Pa., concurred in this view when he addressed the group. It appears, he said, that demand for heavier-gage plates may increase 20 per cent in 1957 and remain tight for many years ahead, although there is a possibility of a slackening in demand for light gages.

Even if the steel industry were to start today to relieve this tightness, he said, not an added pound of steel would result in less than 18 to 24 months.

Mr. Huston reaffirmed the recent announcement that Lukens is preparing to expand its capacity to produce heavy plates, with the added capacity exceeding 150,000 tons per year.

E. E. Michaels, president, Chicago Bridge & Iron Co., Chicago, was elected president of the association. J. Dwight Evans, Chicago, was renamed executive director and secretary.

Diecaster Speeds Finishing

Over $500,000 worth of finishing facilities have been added by Precision Castings Co., a division of Harsco Corp., Syracuse, N. Y. They include automatic equipment for cleaning, phosphate coating, copper-nickel and chrome or brass plating, electrostatic spray painting, baking and polishing.

Congress Talks Budget Cut But Little Action Is Seen

LAVISH AND EXTRAVAGANT are only two of the adjectives you'll hear economy talking congressmen apply to President Eisenhower's $72-billion fiscal budget for 1958. There'll be much of that talk in coming months, and it leads to speculation that Congress will chop sizable chunks off the President's requests. Even some administration leaders have implied they would welcome such action. Net results, though, are more apt to be like attacking a redwood tree with a paring knife: A little may be whittled off here and there, but you'll have to look close to see the result. In other words, it's unlikely that Congress will pare the budget estimate enough to push federal spending under $70 billion—which is about $1 billion above this year's spending.

Defense Chiefs Beat Drums

Upping the odds in that direction: More than 60 per cent of the budget is for defense. Pentagon chiefs are already beating the drums that they can just squeeze by. So the most outspoken economy advocates won't call for big cuts there. In view of the world situation, there may be some talk of increases. Another 10 per cent pays interest on the national debt—no chance for reduction there. Much of the remainder supports essential government functions. There may be some trimming in foreign aid, a little on domestic welfare and educational programs, perhaps even a small cut in the defense allotment (mostly on fringe programs). Hard goods buying and research and development will stay high.

General Tax Cut Unlikely

Such pruning is hardly likely to yield enough of an additional surplus for a general tax cut, even if the anticipated rise in federal income (which is counted on to balance the budget) does come in. Also against tax reduction: Inflation is becoming enough of a danger that even the enthusiastic tax cut advocates are backtracking, wondering about the effect of such a move on the economy.

May Check 5-Year Write-Off

Watch for announcement of a Congressional look-see at depreciation and amortization. Several proposals are in the works to replace the five-year fast tax program of the Office of Defense Mobilization. Features under consideration include possible 10 to 15-year write-off periods for long-lived facilities and a requirement that the facilities meet some emergency or defense criteria. If any of the proposals see daylight, Congress will give them a thorough going over. If the proposals are kept under wraps, Congress may look at the subject anyway.

SEC Opens Up Atomic Field

The Securities & Exchange Commission has paved the way for more industrial firms to enter the atomic energy field by ruling that Power Reactor Development Co. is not an electric utility company. Some of the industrial sponsors of PRDC had threatened to pull out if the company was held to be a utility because that would bring it under restrictions of the Public Utility Holding Company Act of 1935. PRDC is building a reactor at Monroe, Mich., which several labor unions have opposed on the ground that it endangers residents of Detroit and Toledo, O. The Atomic Energy Commission held a hearing on the subject Jan. 8 and has another scheduled for today.

Straws in the Wind

- Attempts to raise the $1 minimum wage will run into stiff administration opposition this year. Reason: The inflationary pressure it would have on the economy. Flipping the coin, though, puts the administration behind efforts to extend minimum wage provisions to industries not covered. That, it's claimed, will not be inflationary if done according to "suggestions" the administration will make.
- A continuing drop in homes built on GI loans is presaged by the Veterans' Administration's December figures on appraisal requests. They were down to 19,029 from 21,941 in November and 24,892 a year earlier. Housing starts are down to 14,987 from 17,824 in November and 21,611 in December, 1955. Tight mortgage money is given as the reason. Look for two different approaches to come up in Congress: Ike's proposal to permit a similar increase on VA loans and a Democratic-backed program of direct government loans.
- The Small Business Administration loan program is at a new high—345 loans totaling $18,154,000 in December.

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U. S. NAVY PHOTO

With maximum separation of five feet between each plane, the "Blue Angels" demonstrate precision tactical techniques of naval aviation at speeds of 500 mph and better. This famous team of Navy pilots has thrilled millions of aviation enthusiasts with its "minimum altitude" performances of close order precision flying.

To a constantly increasing number of manufacturers, particularly aircraft and jet engine builders, moving metal by The Cincinnati Milling Machine Company's *Hydroforming* and *Hydrospinning* processes is equally dramatic. Formerly difficult-to-make aircraft, engine, missile and other components are being produced in rapid development time . . . with savings of 50% and more in tooling, materials and labor. These part shapes range from simple to highly complex, formed from a wide range of metals. For detailed information on Hydroforming and Hydrospinning, call in a Process Machinery Division field engineer.

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NOZZLE, Hydrospun from a wrapped and welded tube (shown at right) of AISI 4130 steel in four passes. Hydrospun parts, having undergone a severe shear deformation, possess increased strength, hardness and resistance to fatigue.

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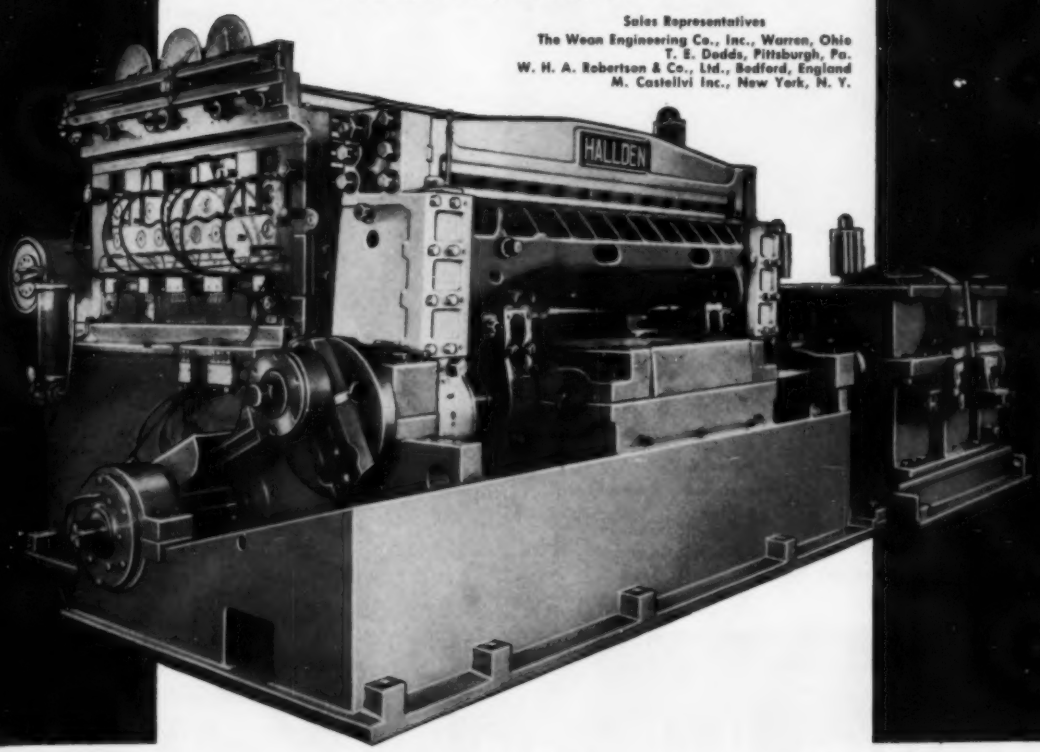


Where Steel Capacity Gains

Republic and Armco make the largest advances. Five steel companies report declines over the past year, but total potential climbs 4 per cent to 133.5 million tons

ARMCO Steel Corp. and Republic Steel Corp. increased their steelmaking capacities in the last year more than any other steel firms.

On Jan. 1 of this year, Armco's capacity to make steel for ingots was 800,000 net tons larger than it was on Jan. 1, 1956. Republic boosted such capacity 875,000 tons.

Third Largest — Republic, with steelmaking facilities in eight cities, now has a total steelmaking capacity of 11,047,000 net tons. It continues to be the country's third largest steelmaker. Republic increased its capacity without adding any furnaces.

Armco, with steelmaking plants in four cities, along with its Sheffield Division which has steelmaking facilities in three cities, now has a total steelmaking capacity of 5,950,000 tons.

Some Declined — While many steel companies showed capacity increases on Jan. 1, 1957, some showed no change, while five reported decreases. The result: On Jan. 1, 1957, our national steelmaking capacity was 133,459,150 net tons, an increase of 5,096,060 tons (4 per cent) over the Jan. 1, 1956, level.

Open-hearth capacity rose 4,595,370 tons (4.1 per cent); electric furnace capacity climbed 782,690 tons (7.3 per cent); crucible and oxygen converter capacities remained unchanged; and bessemer capacity slipped 282,000 tons. Capacities now are: Open-hearth, 116,912,410 net tons; electric, 12,041,740; crucible, 40; oxygen converter, 540,000; and bessemer, 4,505,000.

More Furnaces — The country now has 921 open hearths, an increase of ten in the last year, and 271 electric steelmaking furnaces, an increase of four. There were no changes in the number of bessemer converters, oxygen converters and crucibles. There are 33 bessemers (ten are used only in melting charges for open hearths), three oxygen converters (at McLouth Steel Corp.'s Trenton, Mich., plant), and one crucible (at Baldwin-Lima-Hamilton Corp.'s Burnham, Pa., plant).

All the ten largest steel producers increased their steelmaking capacities, but only three added furnaces. The others accomplished their gains through enlarging furnaces and improving practices.

Blast Furnaces—Similarly, gains were made in blast furnace capacities. There was only one more stack on Jan. 1, 1957, than there was on Jan. 1, 1956, but total capacity rose 1,332,720 net tons (1.5 per cent). Capacity is 86,817,950 tons.

Coke Capacity — Capacity for making coke (blast furnace fuel) went up 1,462,580 net tons (2 per cent). Capacity is 72,970,980 tons.

Better Supplies

Warehouse trouble spots, says the American Steel Warehouse Association Inc., are: Heavy plates, structurals, seamless and oil country pipes and nickel bearing grades of mill products.

Rundown—Light gage plate requirements may be filled more easily in 1957. If demand for sheets continues to dip, some producers can roll light plates on hot strip-sheet mills. Products used principally for consumer goods (hot-rolled bars, flat-rolled products and tubing) will be readily available.

Geography — Eastern warehouse sales could top 1956's by 11 per cent.

The needs of diversified industry and a growing construction program will assure southern warehouses of a year at least as good as 1956. Sore point: Lack of local plate mills.

Southwest—It will be a good but competitive year. Merchant product sales will be off because of the drought. Demand for warehouse steel for repair and maintenance of oil wells coupled with chemical industry purchases will help assure a peak year. Plate demand is at an all-time high for barges (offshore oil drilling). Problem: Local mills are quoting a different set of extras than eastern mills. Warehouses buy from both.

Midwest — Agricultural equipment makers are suffering. Mining, aircraft and oil industry activity will pick up the slack. More light industry continues to flow into the western part of this area.

Forecasts by west coast warehouses range from "equaling last year" to "topping it by 15 per cent."

Top Ten Steel Producers in the U.S.

Steelmaking capacity—net tons

	1957	1956	Increase, 1957 over 1956
U.S. Steel Corp.	39,582,000	39,215,000	367,000
Bethlehem Steel Corp.	20,500,000	20,000,000	500,000
Republic Steel Corp.	11,047,000	10,262,000	785,000
Jones & Laughlin Steel Corp.	6,600,000	6,166,500	433,500
Youngstown Sheet & Tube Co.	6,240,000	5,750,000	490,000
National Steel Corp.	6,200,000	6,000,000	200,000
Armco Steel Corp.	5,950,000	5,150,000	800,000
Inland Steel Co.	5,500,000	5,200,000	300,000
Colorado Fuel & Iron Corp.	2,829,500	2,514,500	315,000
Wheeling Steel Corp.	2,200,000	2,130,000	70,000

American Iron & Steel Institute.

Armco Steel Corp. training courses aim at job upgrading, not hobbies

Primer for In-Plant Training

Industry is forced to it as one way to solve the skilled labor shortage. Here's how you can start and operate such a program for your company

GROW 'EM OURSELVES—more metalworking managers are adopting that idea to meet a mounting skilled worker shortage; more will be forced to.

One way to "grow 'em": In-plant training. Its chief aims: 1. Teach an employee a job. 2. Upgrade semiskilled workers. 3. Prepare skilled and professional workers for more responsibility.

Most successful programs are directed at the visible problems of making a living and advancement and are not complicated with fringe courses in hobbies.

Check List—To begin an in-plant program, pin your skilled help needs down to specific jobs. This check list used at Republic Aviation Corp., Farmingdale, Long Island, N. Y., may help (perhaps your foremen can give it a closer-to-the-job approach than you can):

1. What is your problem?
2. When did it become apparent?
3. What evidence is there that the problem exists?
4. What are the acceptable job standards?
5. What standard operating procedures are there for maintaining the acceptable standards? Are they being held to? If not, which ones?
6. What does supervision have to say about the problem? If there have been recommendations, what has been done about them?
7. Has there been enough follow-up on initial job training?
8. Have there been major personnel changes? Why?
9. Have both upper and lower supervision fully co-operated to correct the problem?
10. What do you think training can do to help?

If training looks like an answer, get top management's support by pointing out these advantages:

1. It's under job conditions and is more likely to be directly job-related than is an outside program.
2. The training can be readily kept up to date by changing it as the job changes.
3. You can keep direct control of what is taught and how it's taught.
4. It's usually cheaper than outside plans.

Says Bob Hauserman at Thompson Products Inc.'s Jet Division in Cleveland: "Climate is the most important thing for a successful training program. The workers have to know that you're going to do: 1. "Provide opportunity for advancement. 2. Give recognition to those who have completed the program. 3. Upgrade them as fast as you can."

Sell Opportunity — That may mean a selling job for management. Get your foremen and union to help (most unions are co-operative when it comes to training). You can't guarantee that every worker who takes in-plant training will be upgraded—your union contract and/or work load probably won't permit that. But make it clear that when possible workers who have had the training will get first consideration.

Beware—Avoid possible trouble by making sure:

1. That instructors know how to teach as well as what to teach.
2. That training is well planned around content and scheduling.
3. That workers on the job don't worry about losing it because new men are being trained.
4. That too much time of your production people is not spent training.

5. That management realizes it is difficult to measure specific progress at a given point for all trainees because their experience will have varied.

It's best to have skilled training people in on your planning. If you can't afford a full-time man, consult with local vocational school officials. They can help or find someone to work with you part time.

Watch Out—But keep the brakes on; the most successful in-plant training programs are those that most closely relate the teaching to the job. So don't overtrain; you're not competing with educational institutions. The final test of subject matter should be: Does the man have to know this to do his job?

In setting up a course, figure out in advance:

1. What is the best way to learn this material—observing or doing?

2. Do you want to teach on the job (which might tie up needed machines or work space), or will it be better to set aside a specific training area?

3. Who is going to teach? (Most firms prefer their own men—foremen or engineers—for o.) phases of study, a trained teacher for classroom subjects like math, blueprint reading.)

4. Will it pay you to give your potential instructors a course in instruction?

5. Can firms that sell you equipment or supplies contribute advice or personnel to your program?

6. Does the probable number of workers in the program justify a full-time training man? (For a continuing program, most firms find it costs no more than a parade of part-time men; you also get better control over what's taught.)

7. Will workers train full time or just part of a shift? (Full time is regarded as most efficient, but if workers are needed on the job, part time may be a better answer. If you have trainees on both day and night shifts, try combining them in a 2-hour class by having the day shift stay an hour late, the night shift trainees come in an hour early.)

8. Most workers are paid while training—will you pay them their regular rate or a learner's rate for training time?

9. Who is responsible for the training program? (In general, the farther down the line you can hold responsibility, the better.)

Interest—Plants with good training programs report little trouble getting workers interested. States Richard E. Hoppe, director of training, Minneapolis - Honeywell Regulator Co., Minneapolis: "Training for a specific job cannot present a problem if the student is a new employee. In other training situations, learners are attracted first by a need, then well-organized instruction. If we find a lack of students, either the instruction is poorly organized or it is not needed."

Big stimulant to worker interest: Follow-up by management to insure that training does pay off, with a promotion-from-within policy.

Who To Choose — Many firms find interest so high they have to screen applicants. Most rely heavily on judgment of foremen and supervisors. Some combine this with mechanical or other aptitude tests. Testing is also used to screen new employees who will need training, but many personnel men believe a good interview can be just as effective. For present employees: "If selection is fair, the program is not resented even by those not eligible or not selected," says James H. Smith, general manager, Central Foundry Division, General Motors Corp., Detroit.

Armco Steel Corp., Middletown, O., uses these methods: 1. Recommendation to a specific course by a man's supervisor. 2. Recommendations by a supervisor based on an annual training survey he makes of his department. 3. Requests by individuals. In 1955, about 27 per cent of Armco employees completed one or more in-plant courses.

Money—Training costs are hard to figure. The chief item is wages of trainees and instructors, so that depends on the length of the schooling. At Hughes Aircraft Co.'s El Segundo, Calif., plant, for example, semiskilled assembly workers get the equivalent of seven working days of training. Components testers spend twelve 40-hour weeks in a special lab; unit testers get an additional 200 hours; system testers receive 120 hours more.

Osborn Mfg. Co., Cleveland, makes sure a training program is paying its way by: 1. Giving the employees a mechanical aptitude test at the start and end of course; scores are compared for improvement. 2. Checking trainees' scrap losses during and after training.

Most firms say the pirating of trained people is negligible. "If we are frightened by the thought of developing people for other companies, we will never operate a successful personnel development program," says Honeywell's Mr. Hoppe. Selective recruiting can help minimize losses. Points out F. T. Kedzior, assistant personnel manager at Osborn: "If you choose wanderers, you're going to lose them."

To hold your people after you train them: 1. Keep your training aimed at a specific job as it is done in your plant. 2. Give recognition and opportunity to advance to those who take training. 3. Keep wages competitive.

To start an in-plant program:

Get support from top management.

Expect to spend some money.

Get qualified people to teach.

Point out benefits to workers.

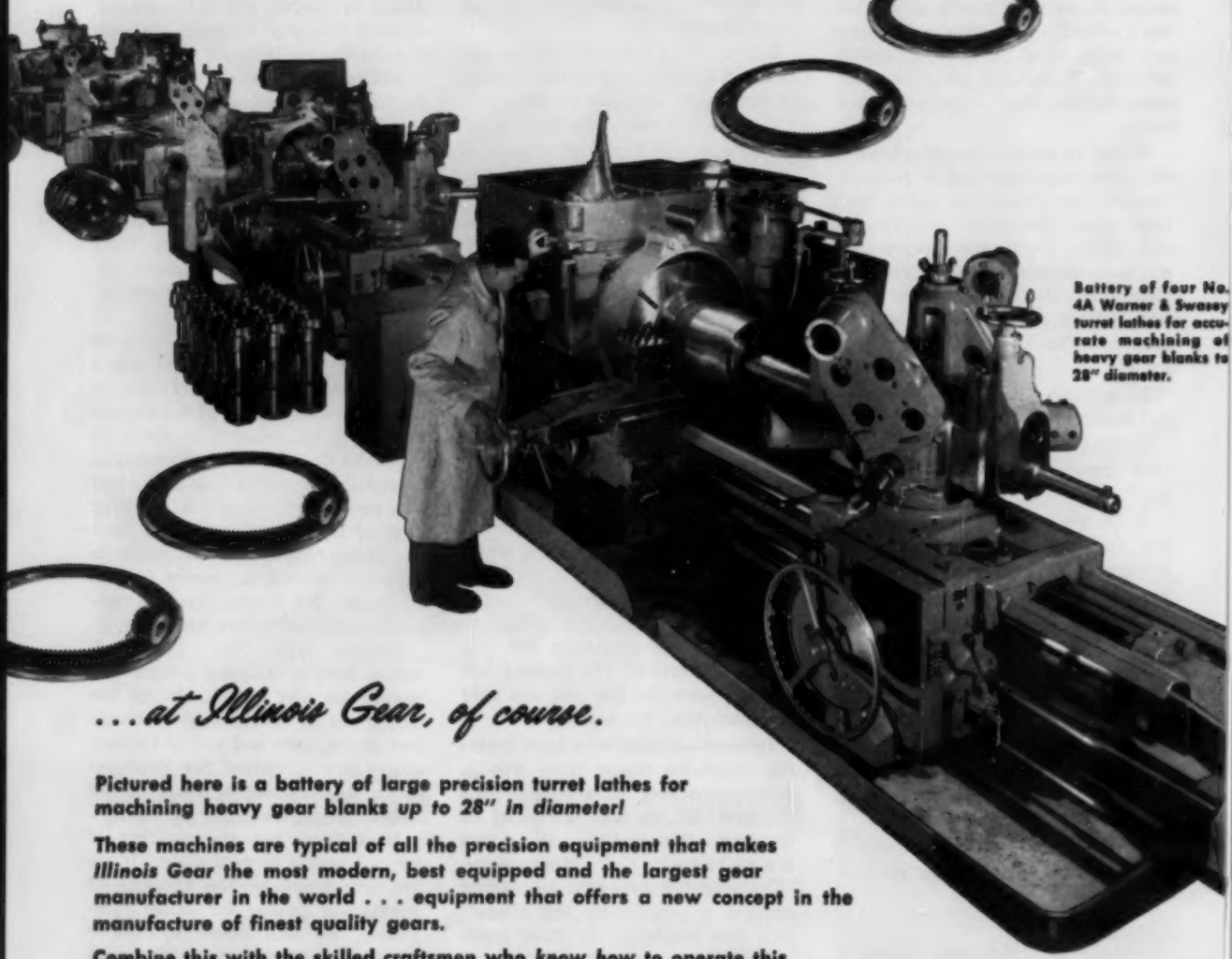
Work closely with foremen.

Plan your program around what a man needs to know to do better on the specific job you're training him for.

Follow up with a policy of "promotion from within" wherever possible.

• *An extra copy of this article is available until supply is exhausted. Write Editorial Service,* STEEL, *Penton Bldg., Cleveland 13, O.*

Where on earth will you find such machinery...



Battery of four No. 4A Warner & Swasey turret lathes for accurate machining of heavy gear blanks to 28" diameter.

...at Illinois Gear, of course.

Pictured here is a battery of large precision turret lathes for machining heavy gear blanks *up to 28" in diameter!*

These machines are typical of all the precision equipment that makes *Illinois Gear* the most modern, best equipped and the largest gear manufacturer in the world . . . equipment that offers a new concept in the manufacture of finest quality gears.

Combine this with the skilled craftsmen who *know how* to operate this equipment and you have the reason why *Illinois Gear* can produce gears that measure up to your most demanding specifications . . . why *Illinois Gear* can make and fulfill delivery promises.

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Aluminum in 1957 Cars

MODEL	Estimated Production†	Aluminum in Average Car	With Automatic Transmission	With Automatic Transmission Power Brakes & Steering
Chevrolet	1,850,550	18.20 lb	24.61 lb	26.11 lb
Pontiac	380,250	15.42	36.42	37.92
Oldsmobile	488,150	10.61	41.43	44.75
Buick	598,650	21.86	43.27	44.77
Cadillac*	156,000	—	—	170.97
Total GM	**3,473,600**	**18.61**	**30.82**	**43.89**
Ford	1,521,000	20.37	37.74	38.12
Mercury	273,650	23.19	44.06	44.56
Lincoln	53,950	—	57.69	59.82
Continental	1,300	—	66.57	68.70
Total Ford	**1,849,900**	**21.78**	**40.19**	**43.73**
Plymouth	498,250	27.17	57.07	71.05
Dodge	222,300	18.46	58.07	72.05
De Soto	113,100	—	83.28	97.26
Chrysler**	117,000	—	—	117.46
Total Chrysler	**949,650**	**24.10**	**63.53**	**92.64**
Nash	20,800	—	57.38	58.98
Hudson	8,450	—	61.08	62.68
Rambler	88,400	39.44	53.60	55.20
Total AMC	**117,650**	**38.97**	**55.09**	**56.55**
Packard	16,250	—	32.88	—
Studebaker	91,000	13.76	17.89	—
Golden Hawk	1,950	—	26.35	—
Total S-P	**109,200**	**12.54**	**21.33**	**—**
Grand Total	**6,500,000**	**20.76**	**38.82**	**51.57**

†Based on 1956 production percentages. *Includes Eldorado and Eldorado brougham. **Includes Imperial. Adapted from Alcoa report.

Autos Boost Aluminum Use

ABOUT 247.5 million lb of aluminum will be used by the automobile industry in 1957, reports the Aluminum Co. of America.

This will average 38.1 lb of aluminum per car if auto makers turn out 6.5 million units this year.

In 1956, the average was 34.6 lb. The year before it was 29.6 lb.

Industry consumption was 235 million lb in 1955 and 200.7 million lb in 1956.

Breakdown—Harry L. Smith Jr., Alcoa vice president in charge of sales development and market research, says aluminum trim is making the biggest gains this year.

Some 13.2 per cent of projected consumption will go for trim applications. That's an 80 per cent gain over 1956 allotments.

Automatic transmissions claim 41.1 per cent and engine components (mainly pistons) account for 32.6 per cent, he adds.

Castings—Aluminum diecastings are helping boost the use of the lightweight metal, Mr. Smith continues. This year's models average 17.7 lb of diecastings, compared with 15.7 lb in 1956 and 12.3 lb in 1955.

L. L. Colbert, Chrysler Corp. president, suggests that castings may increase even more: "Until quite recently, aluminum diecastings were limited to parts weighing 8 to 10 lb.

"New techniques have made castings of 75 lb entirely possible. It's feasible that we can look forward to diecast automotive engine blocks made of aluminum alloyed with zinc and weighing less than 100 lb," he claims.

Radiators—While most industry men feel aluminum blocks are a long way off, aluminum radiators seem to be just around the corner.

"The aluminum-fin, brass tube radiators, now being road tested in several makes of cars, may well constitute the next major use of the metal in automobiles. All-aluminum radiators will follow," says Mr. Smith.

Zinc-Clad—At the national convention of the Society of Automotive Engineers, in Detroit, Kaiser Aluminum displayed a heater core made of zinc clad aluminum.

Kaiser representatives report it can be soldered rather than brazed.

Comments from several interested automotive engineers indicate zinc clad aluminum will be the next step for radiators if the cladding handles the problem of electrolytic corrosion.

Gabfest—More SAE corridor talk concerning aluminum confirms rumors that anodized aluminum in colors other than gold and silver

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will be used for interior trim in some 1959 cars.

One auto maker supposedly is going to try a limited application in '58.

Integrally cast aluminum wheels and brake drums are another likelihood for 1959. Casting problems are keeping them from being used in 1958, says one automotive source.

The aluminum firms suggest commitments for more conventional wheel and drum assemblies are the real reason behind the holdoff.

Conservative—All this adds up to a strong future for aluminum in autos. Mr. Smith even suggests Alcoa's estimate (38.1 lb per car) may be conservative.

Totals based on auto output during a five-week period ended Jan. 5 show the average per car runs closer to 40 lb.

Part of this is caused by the usual early season demand for cars with automatic transmissions, power brakes and steering.

Hafstead Speech Stirs SAE

Aluminum was only one of the highlights at the convention. Dr. L. R. Hafstead, vice president and director of General Motors' research staff was scheduled to talk on "Basic Research and the Automotive Industry." Discarding his prepared speech, he spent a morning spelling out attitudes which could breed trouble in the industry. SAE members mulled over and talked about what he said the rest of the week. Here are some highlights from that talk:

Definitions — Dr. Hafstead defines engineers as men who are trained to accept all knowledge as factual.

Scientists question everything. "Science is aristocratic. It jars the experts out of ruts," he asserts.

Pointing up weaknesses in applied research, Dr. Hafstead warns that industry engineers could become prey to intellectual incest.

"If automobile engineers tend to look only to their own literature for information, they will become a mutual admiration group," he declares.

Fallacious—"This attitude that if the vendor can't supply it it can't be done is fallacious. It's too prevalent in industry.

"The vendor knows his specialty, but industry knows the over-all boundaries where an item can be changed or altered to make it better," continues the GM research director.

At no point did Dr. Hafstead say automotive engineers were guilty of such practices. But rueful comments from the audience indicated he was treading on tender toes.

Functions—Dr. Hafstead thinks such attitudes highlight the need for basic research.

Chemical, statistical and systems engineering research are fields where auto makers still need trailbreakers, he adds.

SAE Checks Crankshafts

SAE members also got the word on sand cast versus shell molded and forged crankshafts, plus an evaluation of pearlitic malleable iron cranks.

Harold F. Wood, executive vice president, Wyman-Gordon Co., Worcester, Mass., says forged steel cranks offer maximum freedom from injurious internal defects.

They can be heat treated to a narrow hardness range which makes more uniform machining.

He adds: "Forged steel as a crankshaft material makes possible the design of shorter, more compact engines."

Cast Cranks—But shell molded cast crankshafts show up to 60 per cent better wear than forged cranks on preliminary tests.

This information comes from Harold N. Bogart, manufacturing manager of Ford Motor Co.'s Mfg. Staff Research Department, and from Harold C. Grand, manager of the Dearborn Specialty Foundry, Ford's foundry division.

Their paper, "Shell Molded Cast Crankshaft," is the first public admission from Ford that the company uses the process. Legal difficulties have forced it to be called precision molding for 33 years.

Other Claims — Shell molding gives closer tolerances than dry sand molding, add Messrs. Bogart and Grand. This makes for easier inspection, gaging and checking.

In addition, stock removal by machining dropped from 24 to 18 lb when Ford switched from sand casting to shell molding.

A final advantage: In the last four years, no patterns have had to be replaced because of wear, say the Ford experts.

Pontiac—Pearlitic malleable iron also offers machining advantages as a crankshaft material, reports Kenneth Valentine, assistant metallurgical engineer of GM's Pontiac Motor Division.

The division has compiled some results from a one month's run of 59,000 forged steel cranks and another month's production of 49,000 pearlitic malleable cast crankshafts.

Comparing the two, tool life was increased better than 50 per cent with castings. The feed rate of several machines was stepped up.

Some 18 lb of metal had to be removed from the forgings, compared with 10 lb from castings.

Summary—General conclusions seem to indicate that forged steel crankshafts make for more costly machining, but hold up better in heavy duty engines.

Shell molded cranks cost less to manufacture (after initial equipment is purchased) and give better wear in automotive engines. They probably won't perform as well in heavy duty jobs.

Pearlitic malleable iron calls for careful quality control, but offers definite machining economies.

U.S. Auto Output

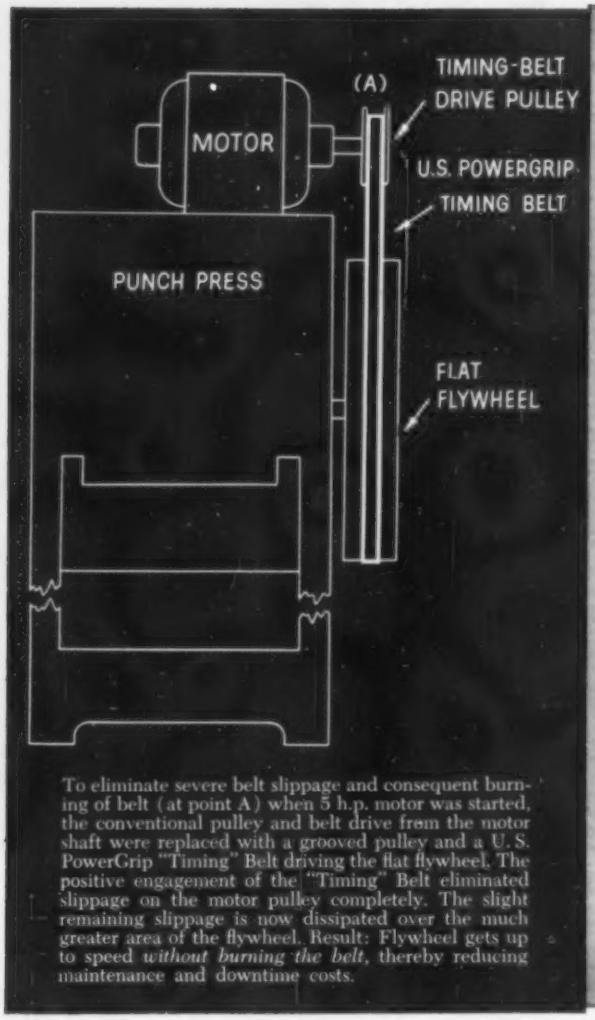
Passenger Only

	1956	1955
January	611,190	659,508
February	554,667	675,495
March	575,559	794,015
April	547,766	753,851
May	471,994	724,892
June	430,141	649,393
July	448,804	659,763
August	401,997	614,493
September	190,709	461,591
October	388,922	517,813
November	581,088	749,061
December	597,083	682,257
Totals	5,799,920	7,942,132

Week Ended	1956	1955
Dec. 22	154,832	150,881
Dec. 29	99,577	105,670
	1957	**1956**
Jan. 5	91,130	125,245
Jan. 12	147,129	149,995
Jan. 19	146,726†	144,729
Jan. 26	146,500*	135,586

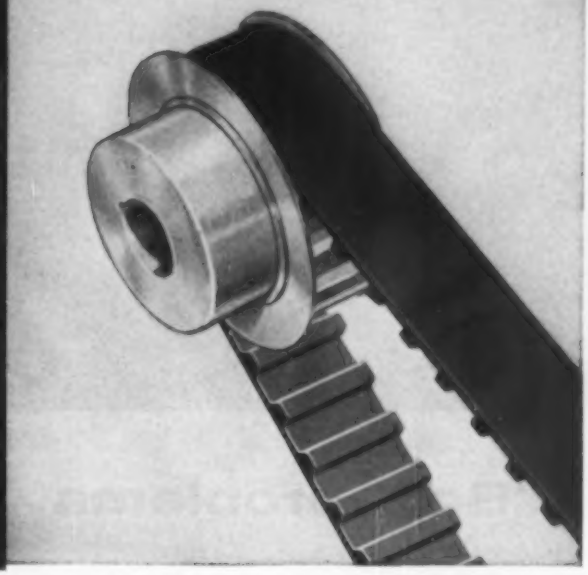
Source: *Ward's Automotive Reports.* †Preliminary. *Estimated by STEEL.

US RUBBER **PowerGrip "Timing" Belts**



To eliminate severe belt slippage and consequent burning of belt (at point A) when 5 h.p. motor was started, the conventional pulley and belt drive from the motor shaft were replaced with a grooved pulley and a U. S. PowerGrip "Timing" Belt driving the flat flywheel. The positive engagement of the "Timing" Belt eliminated slippage on the motor pulley completely. The slight remaining slippage is now dissipated over the much greater area of the flywheel. Result: Flywheel gets up to speed *without burning the belt*, thereby reducing maintenance and downtime costs.

How a plant engineer made this press deliver a better punch



This is one more example of the U.S. PowerGrip "Timing"® Belt's ability to simplify and improve a power transmission unit . . . one of the reasons why the invention of this belt was recently awarded the Franklin Institute's Edward Longstreth Medal for "Invention of High Order."

Whether it's a plant conversion or original equipment design problem, U.S. PowerGrip "Timing" Belts offer the plant and design engineer all these advantages:

- *no slippage, no take-up—allows short centers, high ratios.*
- *absence of metal-to-metal contact—eliminates need for lubrication and housing devices.*
- *handles speeds up to 16,000 F.P.M. or so slow as to be imperceptible to the eye.*
- *close to 100% efficiency.*
- *imbedded with steel cables for high tensile strength.*
- *constant angular velocity.*

These belts—plus expert engineering service—are obtainable at "U.S." power transmission distributors, at any of the 28 "U.S." District Offices, or by writing us at Rockefeller Center, New York 20, N. Y.

US RUBBER **Mechanical Goods Division**

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But how about the mechanical kind of bolt used to connect electrical lines and equipment? They have to be strong and flawless, these fasteners . . . and completely reliable . . . to maintain service under all conditions.

There's a good answer now to that too: *Silicon bronze* fasteners . . . *strongest* of all highly conductive fasteners. RB&W was first to work this material successfully into standard fasteners.

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111th year

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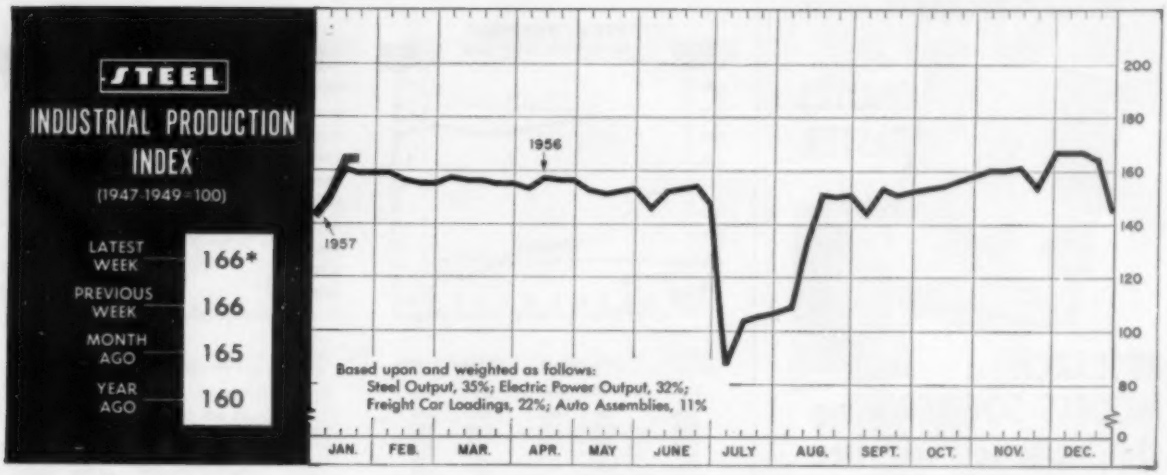
RB&W FASTENERS - *Strong Point of any assembly*



*Week ended Jan. 19.

Production Heads for January Record

THE BEST January on record for industrial production is in prospect!

STEEL's industrial production index (above) shows that this month is already considerably better than any previous one, with the exception of pace-setting December. With two consecutive weeks at 166 per cent of the 1947-1949 average, January has a weekly average of 161.3 so far, virtually the same as the December and November averages. This will not only be the best January on record, it'll be the fifth consecutive time the index has busted a monthly record.

Cold Wave—While production is being maintained at near-capacity levels, it must be pointed out that the index received a considerable "assist" from the weather in mid-January. The coldest spell in many years sent the consumption of electricity soaring to a weekly record of 12.327 billion kw-hr during the week ended Jan. 12. Steel production is maintaining its level of about 2.5 million tons a week for ingots and castings, and the auto industry is steady at close to 170,000 cars and trucks a week. Loadings of freight cars for revenue are rebounding from vacation lows, but at about 680,000 cars, they are still below the year-ago levels. But shippers have predicted an increase of 3.7 per cent for rail shipments in the first quarter over the corresponding period last year.

Another Record—As expected, the Federal Reserve Board's industrial production index hit a new high in December. Seasonally adjusted, the figure was 147 (1947-1949=100), 1 point better than the revised reading of 146 for November. Because of the close correlation between the STEEL and FRB indexes, it is a good bet that the January figure for the FRB will score another monthly high.

With the exception of July, 1956, when steelworkers were on strike, every month since December, 1954, has broken its record on the FRB index. This raises the questions of how long the economy can keep

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)[2]	2,496[1]	2,467	2,472
Electric Power Distributed (million kw-hr)	12,300[1]	12,327	11,521
Bituminous Coal Output (1000 tons)	10,355[1]	7,460	10,635
Petroleum Production (daily avg—1000 bbl)	7,400[1]	7,396	7,045
Construction Volume (*ENR*—millions)	$335.0	$376.1	$608.2
Auto, Truck Output, U. S., Canada (*Ward's*)	179,429[1]	177,542	176,488
TRADE			
Freight Car Loadings (1000 cars)	675[1]	681	699
Business Failures (Dun & Bradstreet)	256	222	245
Currency in Circulation (millions)[3]	$31,108	$31,479	$30,632
Dept. Store Sales (changes from year ago)[3]	+3%	−1%	+5%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$22,763	$23,301	$22,798
Federal Gross Debt (billions)	$276.0	$276.1	$280.2
Bond Volume, NYSE (millions)	$23.0	$22.5	$22.5
Stocks Sales, NYSE (thousands of shares)	11,504	11,859	11,372
Loans and Investments (billions)[4]	$86.2	$87.6	$85.7
U. S. Govt. Obligations Held (billions)[4]	$26.3	$26.8	$29.7
PRICES			
STEEL's Finished Steel Price Index[5]	225.92	225.92	209.10
STEEL's Nonferrous Metal Price Index[6]	251.9	251.7	270.4
All Commodities[7]	116.6	116.3	111.5
Commodities Other Than Farm & Foods[7]	124.9	124.7	119.9

*Dates on request. [1]Preliminary. [2]Weekly capacities, net tons: 1957, 2,559,490; 1956, 2,461,893. [3]Federal Reserve Board. [4]Member banks, Federal Reserve System. [5]1935-1939=100. [6]1936-1939=100. [7]Bureau of Labor Statistics Index, 1947-1949=100.

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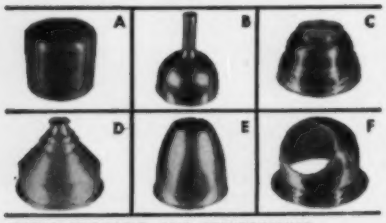
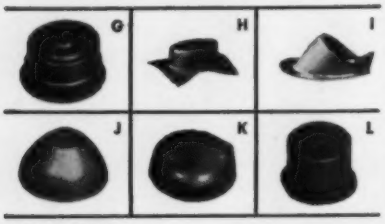


METAL SPINNING AND SPINFORMING:
Typical items: A—Aircraft detail; B—Handle lamp; C—Lamp shade; D—Lamp base; E—Electronic cover; F—Compass cover.



HYDROFORMING:
Typical items: G—Appliance cover; H—Jet engine detail; I—Aircraft detail; J—Jet engine detail; K—Cleaner cover; L—Motor housing.

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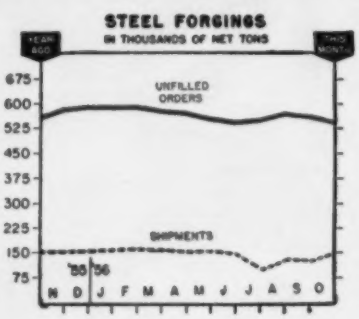
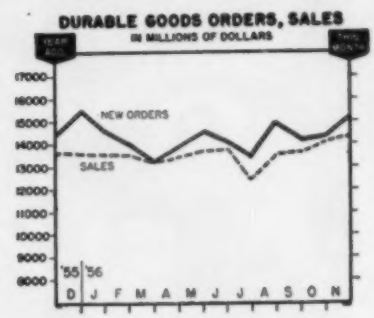
THE BUSINESS TREND



	Shipments		Unfilled Orders	
	1956	1955	1956	1955
Jan.	160	136	589	453
Feb.	152	135	589	460
Mar.	159	154	578	479
Apr.	150	150	569	475
May	151	147	551	458
June	143	155	540	501
July	98	115	547	513
Aug.	123	135	562	547
Sept.	121	149	554	552
Oct.	148	158	539	560
Nov.	...	158	...	585
Dec.	...	158	...	592

U.S. Bureau of the Census. Data based on reports from commercial and ments of 50 tons or more.
Charts copyright, 1957, STEEL.



	New Orders*		Sales*	
	1956	1955	1956	1955
Jan.	14,663	12,142	13,505	11,850
Feb.	14,107	12,170	13,593	12,029
Mar.	13,337	13,353	13,294	12,860
Apr.	14,073	12,879	13,519	12,895
May	14,732	14,331	13,754	13,322
June	14,185	14,033	13,850	13,527
July	13,513	13,571	12,627	13,503
Aug.	15,166	15,145	13,665	13,745
Sept.	14,266	14,936	13,692	13,692
Oct.	14,591	14,094	14,199	13,251
Nov.	15,324†	14,650	14,446†	13,721
Dec.	.....	15,605	.....	13,658

*Seasonally adjusted. †Preliminary.
U.S. Office of Business Economics.

setting such a pace before something gives—and if the break comes, how severe it will be. There are two widely held views of the economy: 1. The boom is not over and will continue to generate new business for our expanded facilities. 2. The boom is spent, at least temporarily, and the momentum gained over the last two years is carrying us into new high ground from which we are bound to slip by the end of 1957.

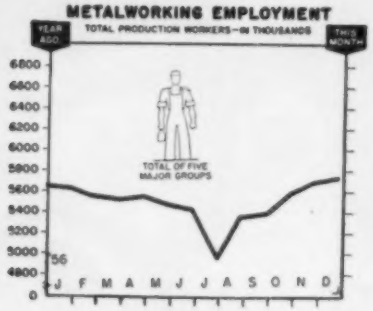
Built-In Prosperity — The first view is based on the premise that an increasing population and rising standard of living require greater production. A year ago, there were 166.8 million people in the U.S. Today, there are close to 170 million people. By 1970, there will be about 213 million. Even if our standard of living remained constant, this increased market would account for a considerable rise in production.

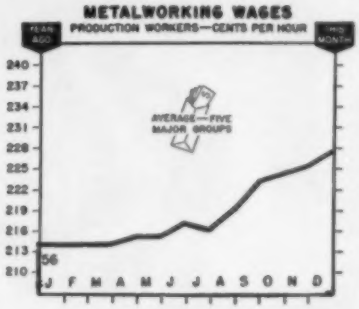
This view does not rule out periods of "rolling adjustment." In fact, many economists believe we have had a "rolling prosperity" for the last two years. As one segment of the economy lost speed, another accelerated to take its place. Few uptrends are smooth.

The second view is held mainly by those who rely on the "cyclical" or historical pattern of business. A "boom" can go only so long and so high before a reaction sets in to cause a "bust." Today, there are certain elements which bear a strong resemblance to conditions prior to the big bust of 1929, giving rise to much talk about the end of the present high level activity.

Some Trends Turning Down

It is true that certain business indexes are moving the wrong way. For instance, the screw machine products industry, which considers itself an accurate barometer of industrial trends, has experienced a steady decline in new orders since last April. Manufacturers of resistance welding equipment report new orders are on a decline. New orders for foundry equipment are well below year-ago levels. After setting records in mid-1956, material handling equipment producers are noticing a drop-off in orders. Orders for steel forgings are lower (see chart above). Taken alone, these statistics might be forecasters of doom, but in the over-all picture, they lose some of their sting. New orders for all durable





1955	Prim. Mtls.	Fab. Prod.	Mach. Inery	Elec. Mchy.	Trans. Equip.
Dec. 1956	1,141	928	1,250	868	1,471
Jan.	1,141	913	1,261	854	1,449
Feb.	1,138	899	1,274	849	1,392
Mar.	1,130	893	1,281	842	1,354
Apr.	1,136	895	1,292	874	1,332
May	1,117	881	1,281	872	1,295
June	1,118	870	1,278	866	1,269
July	743	825	1,254	854	1,250
Aug.	1,091	864	1,257	878	1,235
Sept.	1,128	885	1,262	891	1,205
Oct.	1,132	911	1,264	914	1,319
Nov.*	1,134	913	1,279	920	1,400
Dec.*	1,136	910	1,292	913	1,442

*Preliminary.
U.S. Bureau of Labor Statistics.

1955	Prim. Mtls.	Fab. Prod.	Mach. Inery	Elec. Mchy.	Trans. Equip.
Dec. 1956	232	203	216	192	228
Jan.	233	203	217	193	225
Feb.	232	202	217	193	224
Mar.	232	203	217	194	225
Apr.	233	204	218	196	226
May	233	204	218	196	226
June	234	206	219	197	228
July	227	206	220	198	229
Aug.	236	207	221	199	232
Sept.	241	211	225	201	236
Oct.	242	213	225	203	238
Nov.*	244	213	225	204	239
Dec.*	246	215	227	205	241

*Preliminary.
U.S. Bureau of Labor Statistics.

goods industries were in a definite uptrend during late 1956 (see chart, page 76).

Savings, Repayments Rise

Some of the short-term unrest comes from the reluctance of the consumer to spend his rising income. He apparently is paying his way out of debts he incurred during the last two years. In addition, personal savings are going up. While this takes some zest out of consumers' durables sales now, it puts the working man in a better position to buy later this year.

Construction may be, in the long run, the best clue to the future. This country has never gone through a serious business setback while construction is booming. The road building program and continued heavy nonresidential building will help offset any weaknesses that may appear in 1957.

New Charters, Failures Up

Last year was a good one for starting new businesses, according to Dun & Bradstreet Inc. New incorporations set a record at 140,775, an increase of 0.8 per cent over the 1955 mark. December rose 10.7 per cent over November, but fell 6.5 per cent shy of the 1955 month.

Some of the shine was taken off the picture by the record number of failures during the year. They rose to 12,686 from 10,969 in 1955, says Dun & Bradstreet. Liabilities increased from $449,380,000 in 1955 to $562,697,000 in 1956. Failures of companies under five years old accounted for 58.6 per cent of the total, with firms over ten years old accounting for 18.3 per cent. In 1955, the older companies represented only 9.1 per cent of the total. Over the year, there was an increase of 25 per cent among businesses with liabilities in excess of $100,000. All industry and trade groups rose last year, with a 31 per cent increase in construction concerns.

National Credit Office Inc., New York, reports that in all the lines it covers failures were up 10 per cent last year. For jobbers of electronic parts, the firm reports: "The cause of most failures was poor management—evidenced by unwarranted expansion in fixed assets or branches, overtrading with insufficient markup and a general lack of co-ordination in departmental management."

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thin strip brass
for
deep drawing

Uniform fine grain size of Somers eyelet brass—less than .010 mm. (75X).

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And this new Selas Furnace provides high production as well as close control of temper and uniformity. It is typical of the modern equipment with which Somers produces copper, brass and other alloys to rigid specifications between .010" and .00075".

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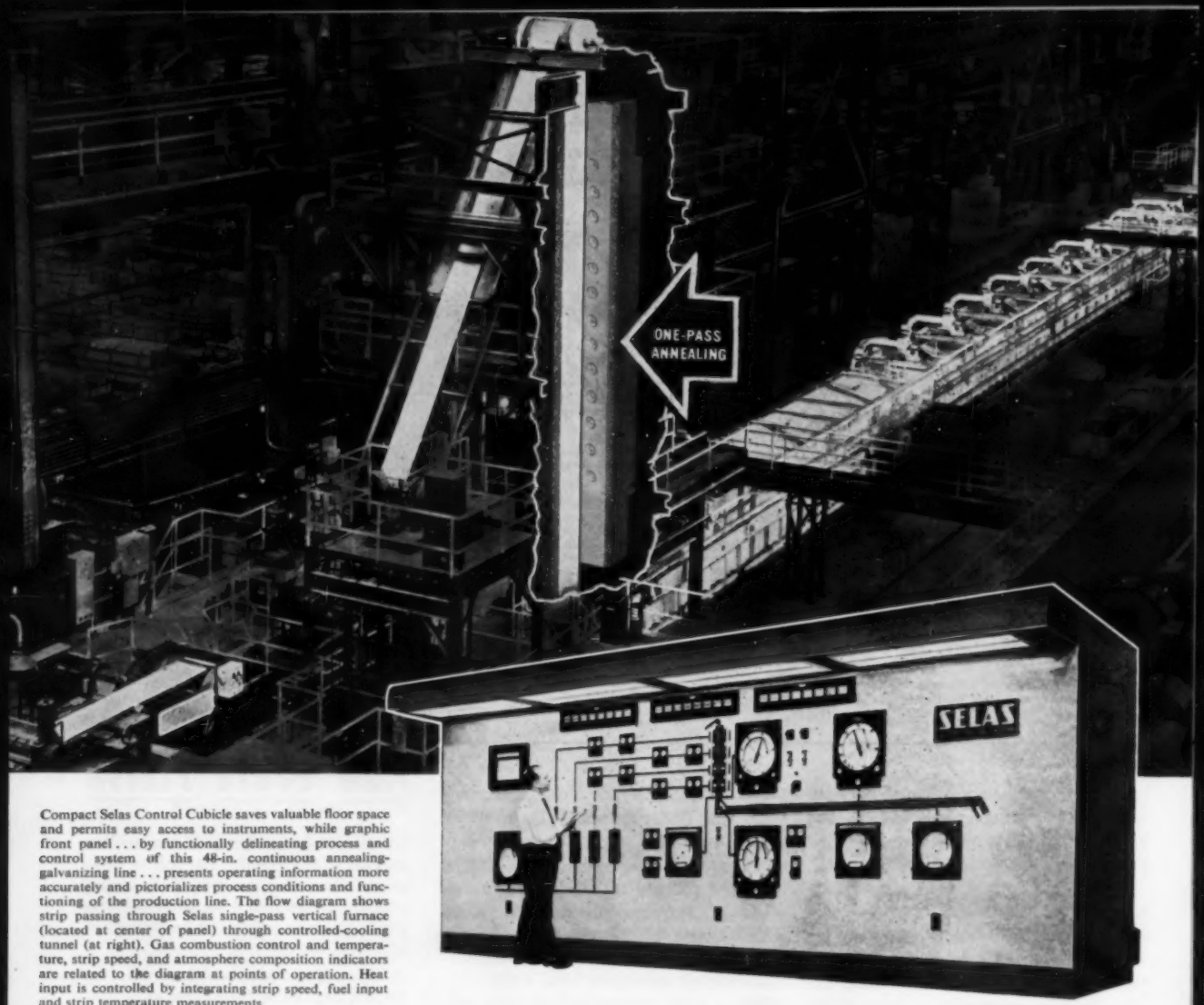

Compact Selas Control Cubicle saves valuable floor space and permits easy access to instruments, while graphic front panel . . . by functionally delineating process and control system of this 48-in. continuous annealing-galvanizing line . . . presents operating information more accurately and pictorializes process conditions and functioning of the production line. The flow diagram shows strip passing through Selas single-pass vertical furnace (located at center of panel) through controlled-cooling tunnel (at right). Gas combustion control and temperature, strip speed, and atmosphere composition indicators are related to the diagram at points of operation. Heat input is controlled by integrating strip speed, fuel input and strip temperature measurements.

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Steel strip is delivered continuously to the galvanizing bath, fully annealed and at temperature conditions best suited to the production of highest quality galvanized sheet . . . by the combination of Selas process control and Selas Gradiation heating.

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In all these operations, radiant gas heat, precisely applied across the strip width, increases heating speed and produces unsurpassed uniformity in product quality.

- Compact single-vertical-pass design saves valuable floor space . . . avoids rolls in heated section, eliminating accompanying maintenance and product quality difficulties.
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- Precise thermal control assures reproducible uniformity, regardless of gauge variations.

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CHARLES P. PINGPANK
Electrolux p. a.

EDMOND B. BUSTER
joins Cherry Rivet Div.

Leslie B. Worthington was elected president, **Columbia-Geneva Steel Division**, U.S. Steel Corp., at San Francisco. He succeeds the late **Alden G. Roach.** Mr. Worthington was president of United States Steel Supply Division, Chicago. **Loren J. Westhaver,** vice president-operations for Columbia-Geneva, was elected executive vice president.

J. Roy Gordon was elected executive vice president, **International Nickel Co. of Canada Ltd.,** and of **International Nickel Co. Inc.,** United States subsidiary at New York.

Elven R. Davis was named vice president in charge of Northwest operations for **Sierra Drawn Steel Corp.,** Los Angeles. Formerly purchasing agent, he moves to the Seattle plant, where he succeeds the late **James Allison.**

Reynold C. MacDonald was made division superintendent of rolling mills at **Kaiser Steel Corp.'s** Fontana, Calif., plant. He was superintendent in the blooming mill area. **Gordon A. Zwissler** was made assistant general superintendent in charge of services.

Buell Engineering Co. Inc., New York, elected **J. A. McBride** president and general manager; **Robert F. Playter,** chairman; **John H. Nicholls,** vice president-secretary; **Henry Dohrman,** vice president-engineering; **S. J. Pascual,** vice president-sales; **G. P. Gouck,** treasurer; **Hugh Mullen,** director of purchasing and administrative assistant.

Charles P. Pingpank was made purchasing agent of **Electrolux Corp.,** Old Greenwich, Conn. He was made acting purchasing agent early in 1956.

Benjamin C. Betner Jr., former vice president in charge of **Continental Can Co.'s** Shellmar-Betner Division, was appointed vice president-sales for Continental's glass and plastics divisions, New York. **Ray C. Schenk** was made general manager of Shellmar-Betner.

Roy O. Schiebel was elected second vice president, **Magnaflux Corp.,** Chicago, in charge of sales and marketing. He was sales manager.

Monro B. Lanier was elected to the new post of vice chairman of the board of **Ingalls Iron Works Co.** and **Ingalls Shipbuilding Corp.,** Birmingham. **W. R. Guest,** executive vice president of Ingalls Shipbuilding, succeeds Mr. Lanier as president.

Chicago Vitreous Corp., Cicero, Ill., named **L. A. Johnson** director of research; **W. J. Plankenhorn,** assistant director-research.

Webster C. Roberts was named director of research for **Harris-Seybold Co.,** Cleveland. He was with Clevite Corp.'s research center.

Penn-Texas Corp., New York, elected **Henry H. Hausner** vice president in charge of its nuclear engineering division. He was manager of atomic energy engineering for Sylvania Electric Products Inc.

Edmond B. Buster was elected vice president and general manager, **Cherry Rivet Division,** Townsend Co., in Santa Ana, Calif. He was sales manager of S & C Electric Co., Chicago.

Herbert R. White was elected president and general manager, **Eclipse Counterbore Co.,** Detroit, to succeed **Roy C. Michell,** now chairman. **I. A. Homrich** was elected vice president - manufacturing. **Austin P. Smith** was elected vice president-engineering.

John A. Morgan, executive vice president, was elected president of **Butler Mfg. Co.,** Kansas City, Mo., to succeed **Oscar D. Nelson,** now chairman.

Richard S. Wolff was elected president, **Camloc Fastener Corp.,** Paramus, N. J.

Feedrail Corp., New York, elected **Albert F. Stoll** chairman; **Frank L. Novak,** president; **Russell R. Stout,** sales manager.

Dudley J. Dreyer was elected executive vice president and general manager of **Craigie Bros. Steel Corp.,** San Diego, Calif.

Edward W. Matasick was made assistant superintendent of the plant-wide roll department at the Indiana Harbor, Ind., Works of **Youngstown Sheet & Tube Co.**

John R. Casey was made manager of manufacturing; **Edward G. Naylor,** manager of marketing for

ALBERT L. HOLLINGER

DONALD K. MARTIN

positions at Surface Combustion

SAM DUPREE

R. B. WARREN

Goodyear management posts

General Electric Co.'s gas turbine department, Schenectady, N. Y.

Alber L. Hollinger, vice president, was placed in charge of sales of all industrial divisions of **Surface Combustion Corp.,** Toledo, O. Mr. Hollinger was sales manager, steel mill division, and is succeeded by **Donald K. Martin,** former Pittsburgh district sales manager.

James A. Travis was named general sales manager, **Ozalid Division,** General Aniline & Film Corp., New York. He succeeds **Louis P. Naylor,** recently made director of product development, a new post. **Louis E. Rampp** succeeds Mr. Travis as branch operations manager. **Hugh R. Silbaugh** was made manager of distributor operations.

Miles E. Goll, vice president, **Wac Line Inc.,** Dayton, O., was named manager of the standard products division. **Burdette L. Bailey** was made manager of a new meter division.

Conde Hamlin, president of DeWalt Inc., subsidiary of **American Machine & Foundry Co.,** New York, was appointed to the new post of deputy group executive of AMF's general products group. He will co-ordinate and supervise operations of subsidiary companies, continuing as DeWalt president.

Convair, a division of General Dynamics Corp. at Ft. Worth, Tex., reorganized its research and development work into a separate department headed by **E. W. Feddersen,** whose new title is chief of manufacturing research and development. He was assistant chief tool engineer, manufacturing research and development. **R. A. Fuhrer,** former chief tool engineer, is now chief manufacturing engineer.

Cutler-Hammer Inc., Milwaukee, named **P. E. Bornfleth** senior buyer for special purchasing assignments; **W. L. Gaulke,** raw materials buyer; **J. R. Leedom,** buyer for supplies; **C. N. Harwood,** in charge of analytical work, cost reduction and procedures.

Charles J. Meloun was made manager of engineering for **General Electric Co.'s** outdoor lighting department, Hendersonville, N. C. He was manager of industrial machinery engineering in the equipment industries engineering section, Schenectady, N. Y.

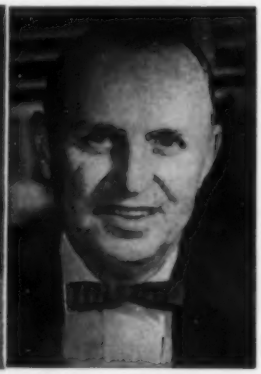
Sam DuPree, general manager, industrial products division, **Goodyear Tire & Rubber Co.,** Akron, succeeds **Joseph E. Mayl,** retired as vice president, general products group. **R. B. Warren,** sales manager, industrial products, succeeds Mr. DuPree.

Alan E. Carlson fills the new post of supervisor of districts for **Federal-Mogul-Bower Bearings Inc.,** Detroit. **Elgin Oehler** was made assistant manager on the central staff. He is replaced as Pittsburgh district manager by **James W. Root.**

M. C. Patterson and **T. F. Morrow** were elected vice presidents of **Chrysler Corp.,** Detroit. Mr. Patterson is president, Dodge Division and

CARL E. SCHMITZ

VANCE E. VORHEES



B. H. STENBERG

Crane Packing executive promotions

Carl E. Schmitz, vice president-sales, was elected executive vice president, **Crane Packing Co.,** Morton Grove, Ill. **Vance E. Vorhees** was made vice president in charge of sales. He is succeeded as assistant general sales manager by **E. H. Stubenrauch,** who was formerly divisional sales manager. **B. H. Stenberg,** former works manager, was made vice president in charge of manufacturing.

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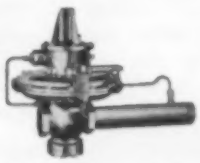

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JAMES M. MORRIS
Nichols Wire plant mgr.

JOSEPH N. LEAVERTON
Hamilton foundry supt.

R. DAVID THOMAS JR.
Arcos president

LESTER W. KRUM
joins Strong Steel Foundry

R. C. PERRY
Diversey gen. sales mgr.

Mr. Morrow is group executive for defense and special products.

R. David Thomas Jr., executive vice president, was elected president, **Arcos Corp.**, Philadelphia. He succeeds **Royal D. Thomas**, now chairman. **James E. Norcross**, general sales manager, becomes executive vice president. **Henry A. Molt**, works manager, was made vice president-manufacturing.

Marc Rojtman was named executive vice president and general manager, **J. I. Case Co.**, Milwaukee. He was founder and president of American Tractor Co., recently merged with Case.

Lanly Co., Cleveland, elected **A. W. Sokolowski** vice president - engineering. He was chief engineer.

Gilfry Ward, president of Amsco Division, **American Brake Shoe Co.**, New York, was elected a vice president of the parent firm.

Martin A. Bertram was made manager of the Great Lakes electric tool sales zone for **Thor Power Tool Co.** at Detroit.

Lester W. Krum joined **Strong Steel Foundry Co.**, Buffalo, as plant manager in charge of all foundry operations. He was superintendent of steel foundries at the Johnstown, Pa., plant of U.S. Steel Corp.

R. C. Perry was made general sales manager, **Diversey Corp.**, Chicago, to succeed **B. B. Button**, recently made vice president-sales. Mr. Perry was Pacific Division manager. New positions in field management structure make **J. M. Sharp** eastern regional manager; **J. K. Bradford Jr.**, southern regional manager; **J. R. McBrien**, Pacific regional manager.

Leon D. Richardson was made assistant general sales manager, **Eutectic Welding Alloys Corp.**, Flushing, N. Y. He was sales manager for the eastern states.

Delbert A. Burman was made a buyer in the purchasing department of **Crucible Steel Co. of America**, Pittsburgh. He is responsible for purchase of miscellaneous scrap and raw materials.

Temco Aircraft Corp. reorganized its Dallas plant operations on a divisional basis, with **John A. Maxwell Jr.** as vice president and general manager, Dallas division. Section managers reporting to Mr. Maxwell are: **Vernon N. Ferguson**, works manager; **J. C. McKelvain**, quality manager; **W. M. Dallas**, controls manager; **R. L. Lewis**, contracts manager.

James M. Morris was named plant manager, **Nichols Wire & Aluminum Co.**, Davenport, Iowa. Prior to joining Nichols Wire in 1953, he was production manager, Blackhawk Foundry.

Joseph N. Leaverton was named superintendent of foundries, **Hamilton Foundry & Machine Co.**, Hamilton, O. He was chief industrial engineer.

Milton Brody was named director of purchasing, **Mohawk Business Machines Corp.**, Brooklyn, N. Y. **W. Fred Heine** was named chief engineer.

Chalmers C. McElvain was named assistant manager, Baltimore Works, **Armco Steel Corp.** **Walter H. Roskott** was made works industrial engineer.

G. D. Pence was elected vice president in charge of the cast iron division of **Universal-Rundle Corp.**, Milwaukee. He was plant manager at Camden, N. J. **H. J. Held** retired as vice president of the company. He continues as an assistant to the president until April.

Laurence L. Hartdorn was made manager of instrument transformer sales in **General Electric Co.'s** instrument department at West Lynn, Mass. He succeeds **James A. Yunker**, now in the transformer division, Pittsfield, Mass.

Donald C. McDonald fills the new post of director of engineering, **Friez Instrument Division**, Bendix Aviation Corp., at Baltimore.

C. Tennant, Sons & Co., New York, elected **Charles F. Osgood Jr.** and **Sidney E. Sweet** vice presidents. Mr. Osgood is in charge of the Griplock Division. Mr. Sweet is secretary.

Frank J. Rossmann was made assistant to the vice president, field sales division, **Giddings & Lewis**

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J. ROBERT SIMPSON III
Conoflow sales mgr.

WARREN L. LOVERIDGE
Laclede Steel post

JACK L. MUSTARD
Ex-Cell-O sales mgr.

Machine Tool Co. at Cincinnati.

J. Robert Simpson III was appointed sales manager, **Conoflow Corp.**, Philadelphia, subsidiary of Walworth Co.

Warren L. Loveridge was promoted from assistant sales manager to sales manager, manufacturers' wire, **Laclede Steel Co.**, St. Louis. **August H. Lamack** was made assistant district manager, construction products sales. **Edgar L. Griesbaum** was made district sales manager, manufacturers' products.

Horace Singleton was made an assistant vice president, **Robertshaw-Fulton Controls Co.**, Anaheim, Calif.

Walter D. Roberts was appointed head of the exploration department for **Laclede-Christy Co. Division**, H. K. Porter Company Inc., at St. Louis. He will direct development of raw material reserves for manufacture of refractories at all division works.

Claude L. Huey was made Atlanta district sales manager, boiler division, **Babcock & Wilcox Co.**, to succeed **Paul R. Yopp**, retired.

Airtemp Division, Chrysler Corp., Dayton, O., appointed **R. L. Lovelace** assistant to vice president-manufacturing; **D. E. Beatty**, manager of production planning and scheduling; **C. E. Henry**, industrial engineer, a new post; **C. E. Corrigan**, supervisor of time study and methods.

David F. Upton was made director of purchases, St. Joseph, Mich., division, **Whirlpool-Seeger Corp.** He succeeds **M. R. Denison**, who will retire during 1957.

Jack L. Mustard was made sales manager, industrial division, **Ex-Cell-O Corp.**, Detroit. He was assistant sales manager.

John L. Burns was elected president, **Radio Corp. of America**, New York, succeeding **Frank M. Folsom**, now chairman of the executive committee. **Dr. Douglas H. Ewing**, vice president, RCA Laboratories, was named vice president, research and engineering. **Dr. James Hillier** was made general manager, RCA Laboratories and is replaced as chief engineer, RCA commercial electronic products by **Dr. George H. Brown.**

T. M. Abate was named purchasing agent for the Cleveland plant of **Iron Fireman Mfg. Co.** He succeeds **A. L. Wallace**, retired.

J. C. Monday was named sales manager, regulator division, **Hevi Duty Electric Co.**, at Milwaukee.

Steven S. Gordon was made assistant general manager, **Republic Gear Co.**, Detroit, subsidiary of Gear Grinding Machine Co.

Eugene J. Vineyard heads the newly established International Division of **L. A. Young Spring & Wire Corp.**, Detroit.

Joseph Friedman was elected president, **Chromalloy Corp.**, White Plains, N. Y. He was executive vice president of United States Hoffman Machinery Corp., and continues as a consultant for that firm.

Kaydon Engineering Corp., Muskegon, Mich., appointed **Robert L. Blais** assistant sales manager, special bearings, to succeed **Robert A. Weisse**, who was made sales manager of a new division formed to handle the Kaydon Size-O-Tron.

Richard G. Griffoul was named manager of manufacturing, **Patterson Foundry & Machine Co.**, East Liverpool, O., subsidiary of Ferro Corp. He was works manager of General Electric Co.'s gearmotor and transmission components department in Paterson, N. J.

Clayton E. Scott was made manager of **Michigan Tool Co.'s** Six Mile Road plant, Detroit. He is succeeded by **Richard S. Hildreth** as chief engineer, machine tool and cutting tool division.

Wallace H. Dodge was made factory manager, **Fellows Gear Shaper Co.**, Springfield, Vt. He succeeds **H. T. Gates** who retires as vice president and factory manager.

Selas Corp. of America, Dresher, Pa., appointed **Quentin M. Bloom** manager, furnace and kiln division; **Charles A. McFadden** manager, general industry division.

Roland Smith, former assistant to aircraft sales division manager, **Fafnir Bearing Co.**, joined **Abbott Ball Co.**, Hartford, Conn., as sales manager. He succeeds **C. B. Schaeffer**, resigned.

OBITUARIES...

E. W. Baird Jr., 59, president, **T. J. Cope Inc.**, Collegeville, Pa., died Jan. 15.

V. W. Nichols, 61, sales director, **Vapor Blast Mfg. Co.**, Milwaukee, died Jan. 16.

Arthur C. Keene, 45, vice president-general manager, **Wausau Iron Works**, Wausau, Wis., died Jan. 15.

M. M. Paxson, 60, director of purchases, **Sun Shipbuilding Corp.**, Chester, Pa., died Jan. 11.

Cyrus H. Loutrel, 70, retired chairman, **National Lock Washer Co.**, Newark, N. J., died Jan. 12.

Fred B. Loucks Jr., 59, president, **Advance Welding Co.**, West Milwaukee, Wis., died Jan. 8.

Archer Rowbottom, 61, chairman, **Rowbottom Machine Co.**, Waterbury, Conn., died Jan. 9.

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"Jess, that's one thing I'm *real* sure of."

"Well, I didn't want to be the first to find out."

"You aren't. Almost everyone knows Chlorothene® is the safe, effective cold cleaning solvent. You can use it for spray, dip, wipe or bucket cleaning."

"I was afraid it might be the kind that catches fire."

"Can't. Unlike petroleum solvents, it has no flash or fire point."

"How about toxicity?"

"It's a low toxicity solvent, too. Has an MAC rating of 500 ppm. In fact, our Safety Engineer recommended it."

"Guess that takes care of the safety angle."

"Yes, and Chlorothene really takes care of the cleaning angle, too. It's high in solvent power and evaporates fast."

"Say, Chet, did you invent this stuff?"

"Nope. Dow developed it."

"Who?"

"Dow. The Dow Chemical Company, Midland, Michigan. You know, the company that makes the complete line of chlorinated solvents—Dow Trichloroethylene and Dow Perchloroethylene Industrial for vapor degreasing, and Dow Methylene Chloride for stripping and cleaning metals. Why don't you write them for the whole story?"

YOU CAN DEPEND ON DOW

Vacuum Melting Up

Kelsey-Hayes' new facilities will help meet growing demand for high-temperature alloys

THE PRODUCTION of alloys by the vacuum melting process is being increased. Kelsey-Hayes Co., Detroit, will build a plant in New Hartford township, N. Y., to house activities of the Vacuum Metals Division of its Utica Drop Forge & Tool Division, Utica, N. Y. The present plant is in New York Mills, N. Y.

Many of the high-temperature alloys that have made the present performance of jet aircraft engines possible have been developed by vacuum melting techniques. A large portion of the output of vacuum melting facilities, including practically all the present output of the New York Mills plant, goes into military aircraft production.

Dr. F. N. Darmara, head of the Metals Division, has expressed the hope that the new facilities will be able to meet more fully the tremendous demand that exists for that type product. The New Hartford plant will also permit an expansion in the research and development section. In addition to continuing its search for better alloys to permit the building of more powerful jet engines for military purposes, the section will work on alloys designed to permit improvements in products for civilian use.

Construction of the new Metals Division plant, containing 100,000 sq ft of production and office space, will begin in March. The move from the New York Mills plant is scheduled to be completed by late fall.

Globe Leases Canadian Plant

Globe Steel Treating Co., Detroit, leased the former plant of Superway Products Ltd. in Tilbury, Ont.

Three Scrap Firms Merge

Three iron and scrap firms in Buffalo will merge into a new firm to be called the Roblin Corp. The merging firms are Buffalo Housewrecking & Salvage Co., Morrison & Risman and New York State Metal Corp. Daniel A. Roblin Jr. will head the new company.

Will Do Subcontract Work

Norco Machine & Sheet Metal Corp., Middleport, N. Y., leased the steel fabricating plant of the Niagara Chemical Corp. The firm will do subcontract work.

New Weldments Plant Set Up

Avery & Saul Co., Cambridge, Mass., manufacturer of weldments, will establish a branch plant for its Pressure Vessel & Special Products Division in Billerica, Mass.

Distributor Changes Name

Atlantic Steel & Iron Co., Springfield, Mass., an aluminum distributing firm, changed its name to Atlantic Aluminum & Metal Distributors Inc. It has branches in Cleveland and New York.

REPRESENTATIVES

Robert Potter, Watertown, Mass., has been appointed New England sales manager for the **Alloy Tube Division, Carpenter Steel Co.**, Union, N. J. He will represent Carpenter in the sale of stainless and specialty welded steel tubing and pipe; sheet and plate forms of Carpenter stainless No. 20Cb.

ASSOCIATIONS

D. C. McPhee, vice president, Borden Metal Products Co., Elizabeth, N. J., was elected president of the **Metal Grating Institute**, Pittsburgh.

H. T. Florence, executive vice president, Cleveland Crane & Engineering Co., Cleveland, was elected president of the **Electric Overhead Crane Institute Inc.**, Washington. Other officers are: Vice president, Frank M. Blum, Harnischfeger Corp., Milwaukee; executive secretary and treasurer, Joe H. Peritz.

Elmer Barringer, Barland Weatherstrip Material Co., Cleveland, was elected president of the **Weatherstrip Research Institute**, Riverside, Ill. Other officers are: First vice president, Harry Zegers Jr., Chicago; second vice president, C. F. Smith, Memphis, Tenn.; secretary, R. P. Rodenbaugh, Memphis; and treasurer, W. F. Michals, Chicago. Grover Klee was re-elected executive secretary.

CONSOLIDATIONS

C. A. Norgren Co., Englewood, Colo., purchased the diecasting firm of **Stemac Inc.**, Denver, and will operate the property as the Norgren-Stemac Inc. The Norgren firm is a large user of diecastings in the manufacture of pneumatic products, including air line filters, pressure regulators and air line lubricators.

Stauffer Chemical Co., New York, has integrated two former subsidiaries, **Nyotex Chemicals Inc.** and **New York-Ohio Chemical Corp.**, into the parent corporation. Nyotex will be operated as Nyotex Chemicals Division; New York-Ohio firm, as part of Stauffer's Industrial Chemicals Division.

Ralco Tool Corp., Buffalo, purchased the machinery and equipment of **K-T Tool Corp.**, that city. The facilities have been moved to the Ralco plant for expansion and modernization.

Robertshaw-Fulton Controls Co., Greensburg, Pa., purchased the **Beta Corp.**, Richmond, Va., manufacturer of vibration controls. Beta's operation is being moved to Philadelphia and consolidated with the Fielden Instrument Division of Robertshaw-Fulton. The Greensburg firm also is acquiring **Acro Mfg. Co.**, Columbus, O., manufacturer of electric switches and house heating controls.

Renois Tying Machines Inc., La Grange Park, Ill., and **A. J. Gerrard & Co.**, Melrose Park, Ill., have merged. Gerrard is in the steel strapping industry. Wire tying operations of the Renois Division will be continued at La Grange Park under the management of W. B. Renois.

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OF THE IMPORTANCE OF SPECIFYING

LYNCHBURG FOUNDRY

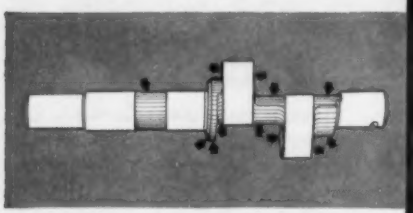
SHELL CASTINGS

GREATER UNIFORMITY—A must with today's high-speed automatic machine tools—it means less fixturing time, lower machine shop losses, and less balancing when required.

LESS MACHINING—Close control of dimensions means less machining, faster machining methods, or in some instances elimination of machining altogether.

MADE FOR LIGHT TRAVEL—Less machine stock means reduced weight—lowering transportation costs both in shipment and within the factory.

SUPERIOR SURFACE FINISH—Shell castings have "eye appeal"—their surface dresses up any finished product. Further, a smooth finish reduces wear on machine tools.



No machining is required on the surfaces indicated by arrows when this refrigeration crankshaft is shell molded.

Exhibit A in the case for shell molding is this refrigeration crankshaft. It may look like a relatively simple piece but machining it was a chore. For every one of the various surfaces a different machining operation had to be performed. Shell molding's smooth finish and close dimensional accuracy meant that a total of twelve (count 'em in the diagram at the left) surfaces could be used as cast. That's twelve time-consuming and costly machining operations eliminated.

Consider, too, the extra stock that had to be machined off when the shell molding process was not used. The original crankshaft before machining weighed 3.5 pounds while the shell molded crankshaft weighs but 2.5 pounds—a tremendous saving in transportation costs when you consider large quantities!

You be the judge. A number of different types of crankshafts are being shell molded in both gray and ductile iron at Lynchburg Foundry. Your verdict? Why not specify Lynchburg Foundry Shell Castings.

GRAY IRON AND DUCTILE IRON—
Heat treated
or as cast

LFC

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Technical Outlook

NEW HIGH TEMPERATURE ALLOY— Known as Incoloy T, a nickel-iron-chromium alloy containing titanium is being produced in sheet form by International Nickel Co., New York. It can be used at 1400°F and higher in some applications. Oxidation resistance is good up to 1600°F. Immediate use will be in highly stressed parts of jet engine combustion systems. Future applications may be in airframe parts of hypersonic planes.

MORE TITANIUM— Electro Metallurgical Co., a division of Union Carbide & Carbon Corp., New York, reports that its new Ashtabula, O., titanium plant has been producing at capacity for the last 45 days. Its annual output is rated at 7500 tons of sponge. A. L. Foscue, Electromet's president, estimates that 13,000 tons of titanium sponge were produced in the U.S. last year and predicts 30,000 tons will be made this year.

BETTER GREASE— A new chlorofluorocarbon grease developed by Halocarbon Products Corp., Hackensack, N. J., is showing up well in field tests as a lubricant for plug-cocks in oxygen plants. It's called Halocarbon Grease Series 25-10. Modifications of the grease are being offered for use under special conditions, such as low temperature or low vapor pressure required on high vacuum systems.

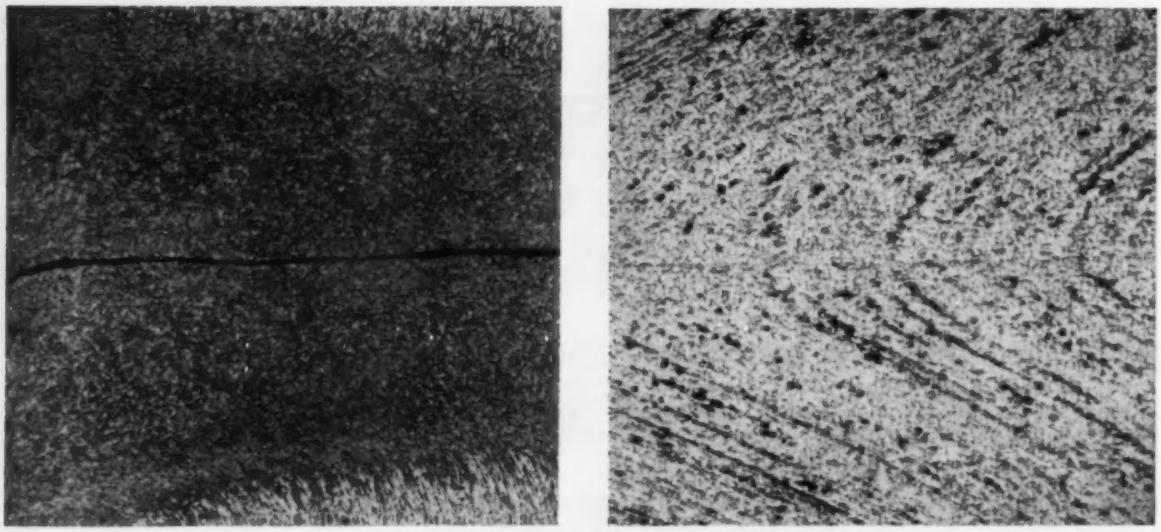
TEST INSTRUMENT— The borescope, an instrument which doctors have used for a long time, is becoming one of industry's newest inspection tools. It's being used to examine the inside of airplane propeller blades, boiler tubes, engine cylinders and many other parts, reports the National Electric Instrument Co., Elmhurst, N. Y. The long, needlelike instrument—in effect, a periscope with built-in flashlight—lets atomic engineers read gages inside reactors from a safe distance. It will go into an opening as small as 1/10-in. in diameter to view surfaces up to 20 ft. away.

UNLOAD CHEAPER— Costs of unloading graphite electrodes can be cut up to 80 per cent by using gondola cars equipped with specially designed bulkheads. Great Lakes Carbon Co., New York, says it's putting 25 of the new cars into service. They were developed in co-operation with Southern Railway System.

TWO FOR ONE— H. M. Harper Co., Morton Grove, Ill., found that its power unit for a hot forging induction heater was in use only part of the time. The development lab needed an induction furnace for experimental heats, so they installed one next to the forging machine. It draws power from the idle induction heater power bank. The money saved far overbalances the slight inconvenience of having the furnace outside the lab.

LADLE STOPPER— A new stopper head for ladles promises to reduce pouring accidents in steel mills and prevent spillage. Developed by Electro Refractories & Abrasives Corp., Buffalo, it's made from flake graphite, fused silica and fired refractory clay.

LIKES HEAT— There's a new electric motor that keeps a cool head in temperatures up to 2100°F. It's designed for mounting on high pressure or vacuum vessels and heat treating furnaces. The end bell and bearing nearest the heat are water cooled. The motors are made by Kaybee Engineering Co., Westmont, Ill.



Here's the difference between a satisfactory and an unsatisfactory weld as a metallurgist sees it. Defective one (left) has a low elongation value

A Metallurgist Looks at Flash Welding

By HIRAM BROWN
Company Chief Metallurgist
Solar Aircraft Co.
Des Moines, Iowa

The right test at the right time and place can clear up many problems in flash buttwelding. Here are the author's experiences with rings and sheet metal bands made for aircraft

THE welding engineer can look to the metallurgist to improve the quality of flash buttwelds. Here are some ways the metallurgist can help:

1. By making and interpreting such tests as: X-ray, Magnaflux or Zyglo for gross defects in welds; hardness tests for weld condition and the effect of heat in zones adjacent to the weld area; tensile tests to compare sections cut from the parent metal with sections cut from the weld area.

2. By making microscopic examinations of weld cross sections to determine excessive cast metal, lack of fusion, carbide networks, flow lines, cracks, chain porosity, foreign inclusions and grain size.

3. By making chemical analyses for decarburization, corrosion resistance, or for properties needed in special environments.

Forming—A number of things happen to welds which can be found only by testing or checking. Not all of them are due to faulty practice. Some are simply random occurrences caused by peculiarities of the metal or similar factors.

Bars or shapes to be welded can be formed cold by rolls, bulldozer-type stretchers or draw formers. Hot forming is used when you want to lower the power requirements on heavier or more difficult sections.

For cold form rolling, raw material should be fairly uniform in hardness. Rings made from unevenly hard material won't match at the joint to be welded. Much unnecessary rework is needed to align them properly. The material should be as soft as possible to minimize the load on forming rollers. Softness and uniformity can be controlled by an anneal and by the hardness requirements on purchased stock.

On types 8630, 4130, 410 and the 300 series stainless steels, a maximum of 187 Brinell is satisfactory. The lower limit is governed by the chemistry of the material itself so the range will not be too wide. The hardness limit will have to be raised for precision rolled shapes which are cold finished to close dimensions. If a satisfactory range is selected, you can achieve good uniformity.

Hardness is not so critical for hot forming. Such material can be used without a hardness range—a saving in raw material price.

Buy Shapes—Flash welded rings made from regular bar stock are popular, but they require excessive machining. To eliminate that you can buy extruded steel shapes. They are more difficult to weld, since rolls and dies must be made for each shape, but the increased costs are more than offset by less machining and a lower purchased weight of material. Where high

How To Avoid Cracks in Rings

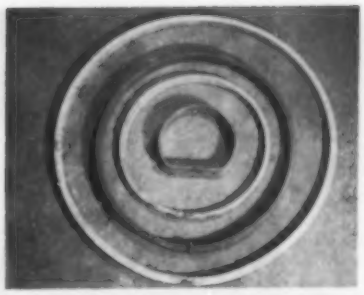
THESE are some typical rings which were cold rolled and flash welded.

To obtain good alignment with the least cost, many producers flatten the ends. The ring at the center (right, above) still retains the characteristic D-shape from that operation.

After welding, the rings are roll formed to restore roundness. That's where you can meet trouble. If the welds are brittle or notch sensitive, die marks can cause cracking. In the heavier bars, forming the D can leave a sharp radius (like a pinch) which will crack when straightened (right, below).

You can eliminate some of those troubles by rounding the D while the metal is hot, but it's not a cure-all.

The best solution: Use rounded dies in the flash welder. They are more expensive and difficult to design. But they save many headaches and reduce scrap.



temperature alloys are involved, there is an additional saving of strategic alloying elements.

Testing—Bending is an excellent evaluation of weld ductility, especially useful during machine setup.

Except for gross defects, x-ray isn't a good way to evaluate heavy flash welds. Many defects which will cause failure during testing fail to show in x-ray.

A good example is titanium. In one case, the parent metal had a 30 per cent elongation, but the weld joint only 1.5 per cent. X-ray didn't show the reason—there was no fusion at the interface.

Tensile Strength—Proper heat treatment after welding is important because it affects working properties, metallurgical structure, end point hardness and tensile properties. Parts frequently need in-process stress relief or annealing before an expanding or rounding operation to insure uniform stretching and absence of localized necking.

For such heat treatments, it's up to the fabricator to select the temperatures and time. Any difficulty from such processing must be corrected in final heat treating.

For in-process annealing, we use 1250°F on 8630 and 1350°F for 410. Subsequent normalizing restores hardness.

Flash weld specifications (AMS 7490, 7493, 7496) give the heat treatments which are needed for a correct metallurgy.

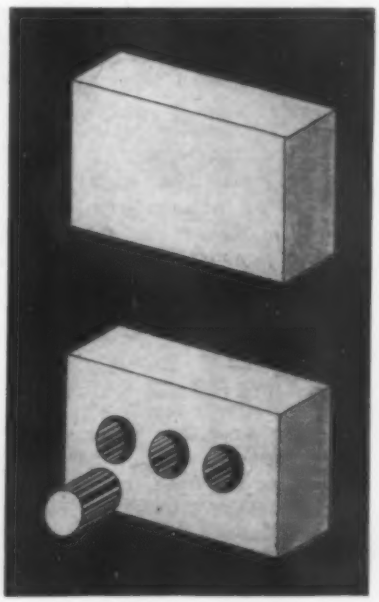
• *An extra copy of this article is available until supply is exhausted. Write Editorial Service,* STEEL, *Penton Bldg., Cleveland 13, O.*

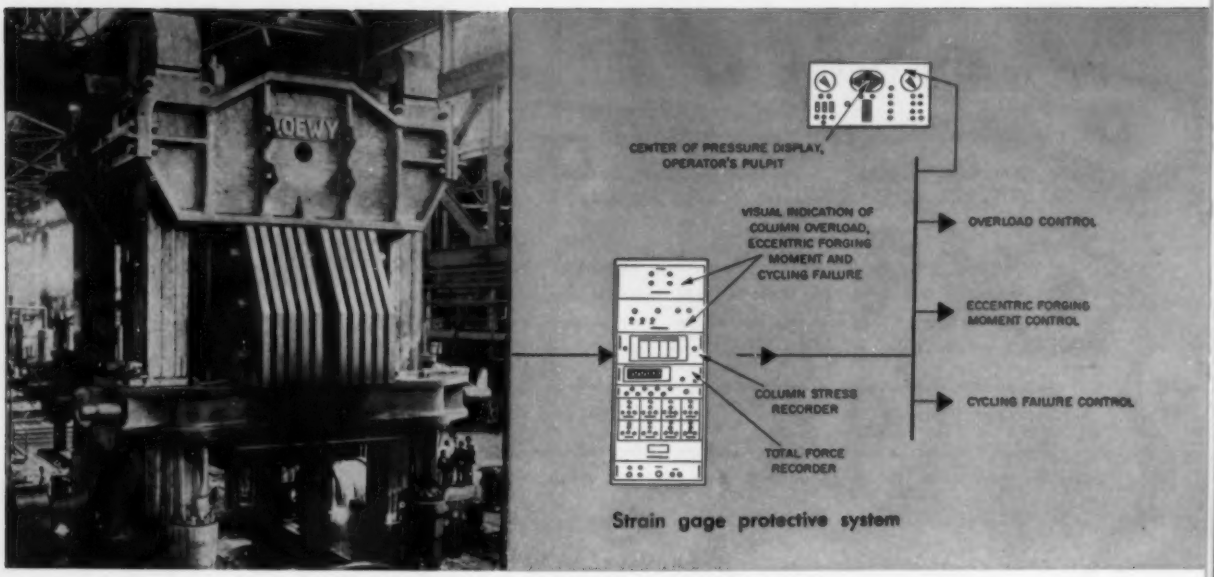
Testing Tensile Specimens

IT makes a difference whether you test full section samples (like those at the right, above) or standard test pieces cut from blanks (like those on the right, below).

Of the three standard test pieces taken from blanks, the ones at the center may fail while the ones on the outside will pass. You can easily see the significance of that in manufactured parts which have had most of the outside stock removed by machining. Look for variations of this difficulty in extruded shapes with odd cross sections.

If a cross-sectional area won't permit you to take more than one sample, remove a 0.505-in. bar from the center for best results. The only alternative is testing the entire section on exceptionally heavy-duty testing equipment. Even then, a standard 0.505-in. specimen is more important in large cross sections — that has been demonstrated at Solar Aircraft with materials like 8630 steel.




LOEWY
CENTER OF PRESSURE DISPLAY, OPERATOR'S PULPIT
VISUAL INDICATION OF COLUMN OVERLOAD, ECCENTRIC FORGING MOMENT AND CYCLING FAILURE
OVERLOAD CONTROL
ECCENTRIC FORGING MOMENT CONTROL
CYCLING FAILURE CONTROL
COLUMN STRESS RECORDER
TOTAL FORCE RECORDER
Strain gage protective system

Air Force's closed die forging press (a 35,000 tonner) at Wyman-Gordon Co.'s Grafton plant. A strain gage protective system built by Clevite Research Center, Cleveland, guards press against eccentric overloads

Heavy Presses:

Strain Gages Stand Guard

ONE OF the most severe requirements imposed on any forging press is the ability to withstand large overturning moments which occur when full power is exerted at off-center positions. Such conditions usually arise from:

1. The difference in shape between the blocked billet and finished forging.

2. The die design which influences flow and temperature in different parts of the forging.

The effect of eccentric load is to induce bending stresses in the frame of the machine and simultaneously cause deflections (sway) of the press structure. These complicate the design and are detrimental to the operation of the press. The bending stresses require excessively heavy structural design to resist failure; the deflections cause die misalignment and mismatch resulting in forgings that fail to meet tolerances.

Protection — There are several ways of taking care of these factors. Guides can be so arranged that the tendency for press entablatures to tilt is resisted by lateral forces which impose bending stresses on the main tierods. Additional hydraulic cylinders which come into action when the forging load moves off center can be provided. These cylinders oppose tilting of the press entablature by providing an equal and opposite reaction.

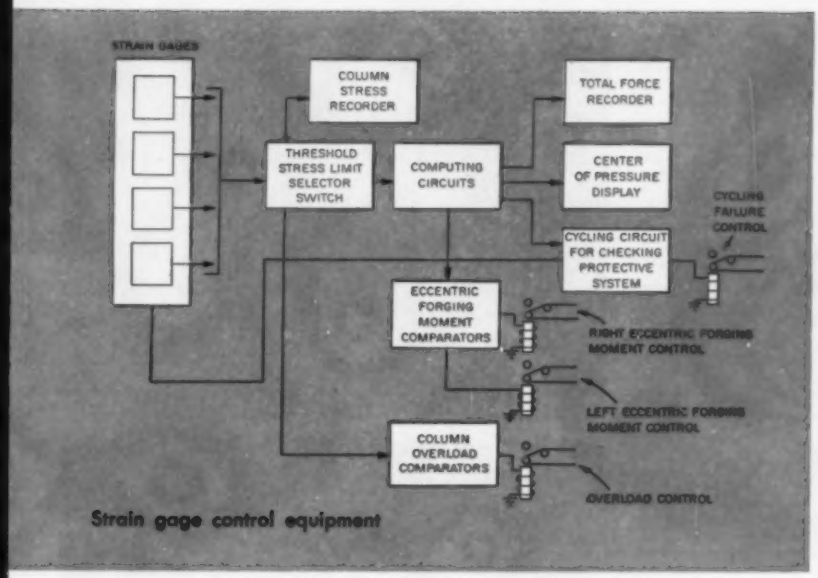
The ideal arrangement is one combining both schemes, utilizing the strength of the structure to its utmost and correcting for any excess moment by the hydraulic arrangements.

Hydraulic—In a hydraulic compensating scheme, two possibilities present themselves: 1. Compensating cylinders can respond to a signal produced by a device which is sensitive to the effects of an eccentric load. This might be a strain gage mounted on the press tierod or some other major part.

2. The compensating system can be an integral part of the press and automatically produce pressure variations within the correcting cylinder which are proportional to the eccentric forging moment.

Allowable — The specifications for a large forging press will show under which conditions each of the hydraulic schemes could best be used. Take the 35,000 and 50,000-ton closed die forging presses built by Loewy Hydropress Division, Baldwin-Lima-Hamilton Corp., New York, for the Air Force, and which are now operated by the Wyman-Gordon Co. at North Grafton, Mass. Their designs specified: An allowable load eccentricity at full tonnage of ± 1 ft in the short press axis and ± 2 ft in the long axis for the small press; $\pm 1\frac{1}{2}$ and ± 3 ft for the large press.

These zones would appear as a diamond shaped area on a diagram representing the press bed. The press will not be required to operate regularly in the extreme portions since the die position and other contributing factors usually may be adjusted to move the load



Strain gage control equipment

By LEON MOLLICK and JAMES JURSIK
Chief Stress Analyst, Loewy-Hydropress, Division of Baldwin-Lima-Hamilton Corp., New York
Project Engineer, Clevite Research Center, Division of Clevite Corp., Cleveland

center within the diamond zone. The area outside the diamond represents emergency operating conditions resulting from die breakage, a cold billet or some unusual flow; the inner area is the normal condition of operation.

Two Schemes—As a result, the corrective system for eccentric load ideally consists of two separate schemes: 1. An automatic or self-compensating hydraulic system designed to operate during the ordinary eccentric conditions. 2. A strain gage controlled system, called into play when the automatic system is at the maximum of its capacity.

The effect of automatic hydraulic compensation is to oppose and nullify the eccentric moment. No lateral forces result, and no large additional bending stresses are imposed on the press tierods.

When the eccentricity is greater than the automatic compensating system can correct, the large bending stresses set up add to the normal tension stress of the tierods. If the eccentricity is not corrected or the press is not shut down in time, the stresses may permanently deform it.

Strain Gages—The stresses are monitored by strain gages located at the critical points on the tierods between the press platens. These gages form part of a strain gage system conceived by Loewy for the protection of the two giant presses. The system was designed and built by Clevite Research Center. This equipment performs a number of functions:

1. Continuously protects the presses against unsafe conditions caused by large eccentric forging loads, die breakage or overload of a major component.

2. Provides additional compensation when the eccentric moment exceeds a preset value.

3. Indicates visually (by a spot of light on the face of a cathode-ray tube) the position of the center of pressure of the forging load in relation to the center line of the press.

4. Indicates and records the total force exerted by the press during forging as it varies with the forging stroke.

5. Indicates and records simultaneously the stress in the main tierods, at the selected gage point, as a function of time.

Into Action—The strain gages, which are mounted on the press columns at critical load points, are the reluctance type and provide the signal sources for the protective equipment. Outputs of the gages are fed into a remote control cubicle where electronic circuits translate the signals into the aforementioned actions.

The control circuitry is designed to be fail safe, so that a power interruption will make the press inoperative. As an additional safeguard, a self-checking feature cycles the system just prior to the forging stroke and indicates if it is functioning properly.

Fast Check—This is done by deliberately unbalancing the strain gage bridges by an amount corresponding to the threshold stress setting. The unbalance voltages cause the protective and control relays to drop out just as if the press were subjected to a real overload or large eccentric load. All the protective and control relays are then checked for normal function.

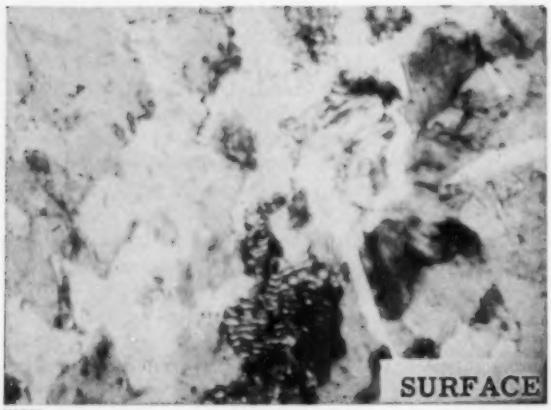
This is done in about a half second while the press is in the "prefill" position. If the system is operating normally, forging is allowed to proceed as the controls enter the "press" position. If not, a relay gives a visual indication of cycling failure and causes the press to return to the open position.

The protective system is rapid. It will provide a signal to shut down the press in approximately 1/20 of a second after a change to an overload condition.

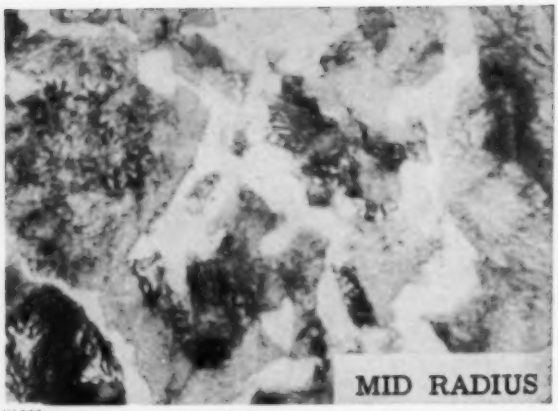
Feedback—Modular or plug-in type construction has been used extensively throughout to make maintenance and trouble shooting easier. An important feature of the system is the extensive application of the principle of closed-loop or feedback operation. This adds greatly to the accuracy and stability of the system.

It cannot be overemphasized that power without control is useless and often dangerous. The big new machines require controls more sensitive and powerful than humans provide, making special-purpose computers such as the strain gage protective system necessary. Such computers are finding wide acceptance as industry attempts to increase production efficiency and automatic material handling becomes widespread.

• *An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, O.*



X1000



X1000

X1000

These three photomicrographs show a uniform, pearlitic structure on the surface, mid-radius and center of a bar of Fatigue Proof

Combining controlled deformation and temperature, this method produces a carbon steel with alloy grade properties. Heat treating may not be required

Warm Drawing Improves Fatigue Life

THE La Salle Steel Co., Hammond, Ind., has found a way to get more out of carbon steel bars.

The process is called elevated temperature drawing. It makes a carbon steel (similar to AISI 1340) resistant to fatigue and tough without heat treating—properties usually associated with chrome and nickel alloys.

The bar product, labeled Fatigue Proof, has this composition: Carbon 0.40-0.48 per cent, manganese 1.35-1.65, phosphorus 0.04 max., sulphur 0.24-0.33, silicon 0.15-0.30.

Unique Combination—The patented process (U.S. patents 2,767,835; 2,767,836; 2,767,837 and 2,767,838, issued 10/23/56) leans heavily on proper composition, since all steels don't respond equally well. The rest of the secret is careful control of the amount of deformation and temperature. Fatigue Proof bars have an ultimate tensile strength of 140,000 psi, yield of 125,000. La Salle guarantees a minimum Rockwell of C-30.

The steel is heated in a lead bath. Bars must be submerged mechanically to produce uniform results. Drawing temperature (600-1200°F) is below that which forms oxide, a cause of high die wear. Draw bench operators wearing asbestos gloves can handle the bars without discomfort.

Elevated temperature drawing ties in bar chemistry with drawing and temperature control to produce these metallurgical processes: The bar is strain hardened by slips within the crystal structure. It age hardens through the precipitation of nitrides and carbon from supersaturated solid solutions. A substructure develops within the grains which increases strength and hardness.

Quality—Fatigue is one of the main causes of failure in highly stressed parts. Many factors contribute to fatigue, but a reliable measure is endurance limit. One of the several ways to measure it is through repeated rotation or twisting of a beam. Two such curves (page 95) were plotted from laboratory data on Fatigue Proof steel. They fall well within the the commonly accepted proportional band between tensile strength and endurance values.

One of the more important factors to longer fatigue resistance is

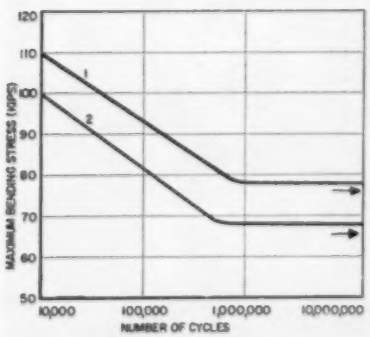
the absence of residual strain. Straightening operations are often necessary to remove the warp from heat treated parts. That leaves them with strained areas which later become focal points for fatigue. Elevated temperature drawing puts the bar stock in the same strength class without heat treatment.

Smooth machining, another plus factor, leaves finished parts without tool marks or tears in fillets and spline roots. Gears made from Fatigue Proof are said to be anti-galling and seizure resistant. Dimensional stability is good, even in long shafts, arbors and spindles.

Homogeneous — An unexpected result of elevated temperature drawing is uniformity across the diameter from surface to center.

Microstructures are almost universally pearlitic (see photomicrographs). Transition temperatures and transition time are not involved. Take a 1⅞-in. bar of 4140, oil quenched and tempered. You'll probably find a Brinell hardness number of 290 at the skin which will fade to 250 at the center. The same size bar of Fatigue Proof steel will be BHN 315 on the skin at 310 at the center.

Evolution—Bar stock was originally furnished in only the hot rolled condition. Demand for better tolerances, finer finish and better machinability led to cold rolled, and later, cold drawn bars—today's product. Elevated temperature drawing carries the evolution another step. Further research may reveal ways to apply the method to other steels.



These fatigue curves are for a rotating beam cantilever, unnotched. Values fall within the accepted limits of tensile and endurance strengths

Properties of Two Production Heats of CD-4MCu

HEAT NO. 84431

Heat Treatment °F	hours	Tensile Strength psi	Yield Strength psi	Elongation per cent	Reduction of Area per cent	Brinell Hardness	Charpy V Notch ft-lb	Corrosion Rate[c] mils per year
850	4[a]	140,900	100,000	25.0	37.9	302	9.5	4.3
850	1[a]	135,800	89,000	25.5	50.8	293	30.5	6
1950	2, W.Q.	112,700	80,700	28.5	48.4	248	104.0	6
None, as cast		121,000	83,500	27.0	41.4	262	18.5	18

HEAT NO. P1

950	3[b]	140,000	120,000	16.0		321		6[d]
2050	1, W.Q.	102,500	85,080	19.0		250		7[d]
None, as cast						270		

(a) Aging treatment preceded by water quenching after 2 hours at 1950°F.
(b) Aging treatment preceded by water quenching after 1 hour at 2050°F.
(c) In boiling 65 per cent nitric acid. Average of five 48-hour periods; two specimens each.
(d) Average of two 48-hour periods; single specimens.

Cast Alloy Resists Corrosion

Developed by the Alloy Casting Institute, it has the corrosion resistance of wrought alloys. It will find applications in valves, pumps and fittings

A NEW high-strength cast alloy has corrosion resistance and mechanical properties comparable to 18-8 stainless.

The alloy was developed in the Corrosion Research Laboratories of Ohio State University as part of the research program of the Alloy Casting Institute. Designated type CD-4MCu, its composition is 25-27 Cr, 4.75-6.00 Ni, 0.04 C (max), 1.75-2.25 Mo, 2.75-3.25 Cu, 1 Si (max) and 1 Mn (max).

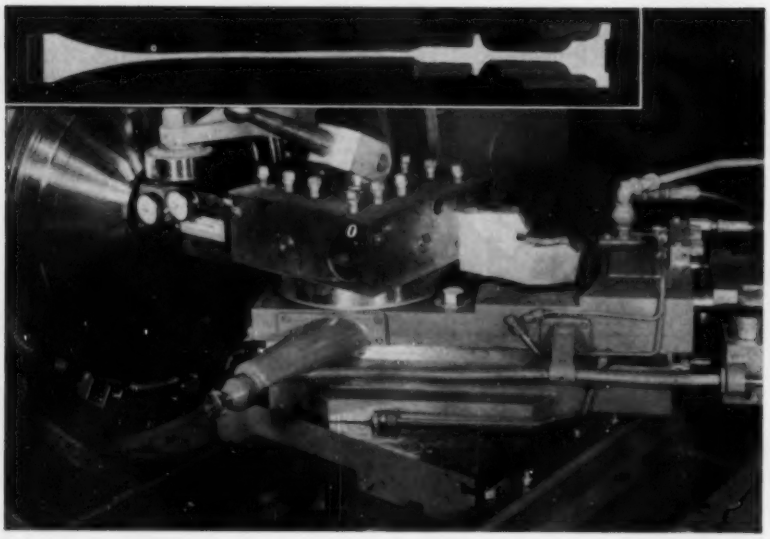
Corrosion Rate — Most other high-strength cast alloys show corrosion rates of 200 to 1000 mils a year in boiling 65 per cent nitric acid, compared with the average rate of 10 mils a year for 18-8. Corrosion rates of the new alloy are shown in the table above.

According to Dr. M. G. Fontana, chairman, Department of Metallurgical Engineering, Ohio State University, not only is the corrosion rate of the new alloy in boiling nitric acid low, but more important, there is no tendency for the rate to increase with time. This is especially important to manufacturers of valves, pumps, fittings and high-pressure components.

Strauss Tests—The corrosion resistance of CD-4MCu has been further confirmed by Strauss tests, which consist of bending the specimens after exposure to a boiling copper sulphate-sulphuric acid solution. Exposed to the solution for 72 hours, the alloy showed no decrease in angle of bend before cracking.

It has shown no corrosion at room temperature in 10 per cent sulphuric acid, 50 per cent sulphuric acid or 0.5 per cent hydrochloric acid. Even in 5 per cent hydrochloric acid, the corrosion rate was only 60 mils a year.

The alloy is reported to have better machinability than 18-8 stainless, good welding and grinding characteristics and good foundry properties, including fluidity and feeding.



Here the cutting tool is juggled into position until the indicators in the disc bore both read zero. The tool is thus centered in the disc. Inset shows cross section of the web from outer edge to bore

An 8-power microscope and adjustable light help the operator set the tool with the master gage template

Jet Discs Are Precision Pared

WEBS on 28-in. jet engine compressor discs can be trimmed to a thickness of only 0.010 in. on the center drive lathe below.

It's turning out parts at Pratt & Whitney Aircraft, East Hartford, Conn. (STEEL, Dec. 17, 1956, p. 92.)

Sequence — After the blank is loaded in the machine, the two carriages are moved up to face the hub. After facing, the operator brings one roller into position to deflect the hub an indicated 0.0005 in. Then he brings down the opposite roller and presses it against the hub until the gage again reads zero. This puts equal pressure on both sides of the disc hub.

A hydraulically operated overhead arm carries an indicator fixture down into the bore of the disc. The tool from the opposite carriage then is moved in and out until the indicators read zero, putting the cutter tip in the center of the disc both longitudinally and transversely.

The operator then backs the tool out half the web thickness. He uses an adjustable micrometer stop to gage this distance. With the carriage locked in position, the Gisholt Jetracer is ready to contour face the disc.

Since the two carriages are independent, both sides of the discs may be cut simultaneously or separately. All machining (except outer diameter machining prior to chucking) is completed in a single setup.

Gaged Position—After the part is faced, the tool is moved back to the center. Two gage rods, one exactly 3 in. long, are put between an adjustable screw on the cross slide and a tenth indicator. Adjusting the screw, the operator makes the indicator read zero. Then he lifts out the 3-in. rod and moves the carriage until the indicator again reads zero. This shows the carriage has moved exactly 3 in.—will cut a 6-in. bore.

General machine view shows relation of cross slides, support rollers and hydraulically operated brackets that hold the indicators

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Sintering Box Score: Machines on Order or Building

Company	Plant	No. of machines	Size	Capacity tons per day*
U.S. STEEL CORP.	Pittsburgh	3	8 x 168 ft	12,000
	Chicago (South Works)	1	8 x 168 ft	4,000
	Gary	3	8 x 168 ft	12,000
	Youngstown	1	8 x 168 ft	4,000
NATIONAL STEEL CORP.	Detroit (Zug Island)	1	12 x 199 ft	7,000
	Weirton	1	12 x 147 ft	5,300
ARMCO STEEL CORP.	Houston (Sheffield)	1	6 x 89 ft	1,200
	Ashland	1	8 x 125 ft	2,100
BETHLEHEM STEEL CORP.	Sparrows Point	2	6 x 102 ft	3,200
GRANITE CITY STEEL CORP.	Granite City	1	8 x 125 ft	2,500
JONES & LAUGHLIN STEEL CORP.	Cleveland (Otis)	1	8 x 125 ft	2,500

*Conservative estimate. All machines listed are capable of greater production.
Source: M. F. Morgan, Arthur G. McKee & Co.

Sintering: Race To Hold Costs Down

Beneficiation and agglomeration mean more hot metal without more blast furnaces. Plants now being built will raise sintering capacity 50 per cent by 1959

"ANNUAL sintering capacity in the United States and Canada is about 38 million tons. By the end of 1959, it will increase to 60 million tons."

M. F. Morgan of Arthur G. McKee & Co., Cleveland, let figures speak for themselves as he emphasized the significance of agglomerating processes for iron ores. The occasion was the annual mining symposium of the University of Minnesota, meeting in Duluth Jan. 8 and 9.

"By 1959, eleven sintering plants, now either in design or construction stages, will be in operation with an annual capacity of about 21 million tons (an increase of more than 50 per cent over present capacity). Two of these plants will each produce in excess of 4.5 million tons of sinter a year. Eleven of the new machines will be 96 in. wide, three 72 in. wide and two 144 in. wide. They will be the first 144 in. machines ever installed to sinter ferrous materials." (See table.)

Location — These machines are all being installed close to furnaces for several good reasons:

1. The sintering plant can be under control of blast furnace management (the blast furnace superintendent can't blame his troubles on the sinter quality).

2. The blast furnace superintendent can have his sinter hard burned or soft burned, whereas shipping

HOT STRIP MILLS

Designed and Built by MESTA

Mesta 80" Four-High Continuous Hot Strip Mill—Finishing Stands Installed at the Fairless Works, U. S. Steel Corporation

Designers and Builders of Complete Steel Plants

MESTA MACHINE COMPANY

PITTSBURGH, PENNSYLVANIA

sinter must be hard burned.

3. Sinter can move by conveyor directly from cooling area to stock house bins.

4. Sintering machines can utilize flue dust and by-product gases from the blast furnace and coke plant.

Among machines yet to be announced, only those for sintering magnetite concentrates are likely to go near the mines. The present steep growth pattern for sintering plants (see chart) will probably continue through 1960 and then taper off sharply, according to Mr. Morgan.

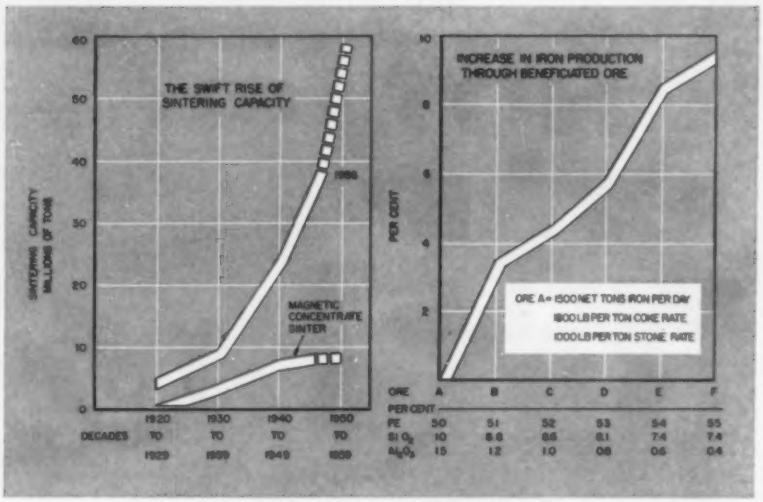
Expansion—The critical role that beneficiation (including sintering) will play in future iron production was pictured by J. H. Strassburger, assistant vice president, Weirton Steel Co., Weirton, W. Va. He pointed out that an increase of 25 per cent in pig iron production is needed to keep pace with increasing ingot requirements. That means 105 million tons of pig iron will be required annually within the next 10 years (we now produce about 84 million tons of pig a year).

This could require 30 to 40 additional blast furnaces (a $1.5 billion capital investment) to maintain the present proportions of pig and scrap. We have to make every effort to minimize this huge investment by increasing the production of iron from existing furnaces.

Beneficiate—It will be necessary to prepare all the burden materials, coke, ore and limestone, so a minimum of raw materials will go into the production of iron. Chief interest is in the beneficiation of iron ore in the burden, Mr. Strassburger asserted.

"Until recently most blast furnace operators have been well satisfied with iron ores which averaged about 50 per cent iron, and 10 to 11 per cent silica," said Mr. Strassburger. "At Weirton we are using about 50 per cent Labrador ore in the blast furnaces. About half of this is being charged in the form of sinter. The ore is averaging about 53.5 per cent iron and 6 per cent silica, with the sinter averaging about 64 per cent iron and 7 per cent silica."

More Iron — "Operating results with this Labrador ore and sinter have shown an increase in iron production of about 20 per cent with a decrease of 300 lb per ton of limestone and over 200 lb per ton saving in coke rate. We are convinced that all the iron ore charged into a blast furnace should be upgraded."


THE SWIFT RISE OF SINTERING CAPACITY
SINTERING CAPACITY MILLIONS OF TONS
1955
MAGNETIC CONCENTRATE SINTER
DECADES
1920 TO 1929
1930 TO 1939
1940 TO 1949
1950 TO 1959
INCREASE IN IRON PRODUCTION THROUGH BENEFICIATED ORE
PER CENT
ORE A= 1500 NET TONS IRON PER DAY
1500 LB PER TON COKE RATE
1000 LB PER TON STONE RATE
ORE A B C D E F
PER CENT
FE 50 51 52 53 54 55
SI O2 10 8.8 8.6 8.1 7.4 7.4
Al2O3 1.5 1.2 1.0 0.8 0.6 0.4

Construction of large sintering plants is under way at National's Great Lakes plant in Detroit and the Weirton plant so that 100 per cent of the burden for the blast furnaces can be beneficiated by charging only sinter and oversize ore. The cost of beneficiating the iron ore will be paid off in increased iron production, lowered blast furnace costs and savings in shipping and handling a higher grade material between the mine and blast furnaces.

Silica—Comments by R. P. Liggett, chairman, blast furnace committee, Republic Steel Corp., Cleveland, fitted neatly into the same picture. He had been discussing the increasing silica content of Lake Superior ores, which has acted to increase slag volume with resulting loss in iron production and efficiency as measured in coke used per ton of iron. By charging an average of 40 per cent Labrador ore with its lower silica content, Republic slag volumes have returned to a satisfactory operating range.

In making comparative evaluations of ores, Republic uses a formula based on a calculated cost to the blast furnace due to 1 per cent of excess silica in an ore.

Expense — "For our lake-front blast furnace operations," said Mr. Liggett, "it has been calculated that 1 per cent of excess silica in the ore charge calls for 84 lb of extra limestone, 39 lb of coke, and results in 89 lb of excess slag per ton of iron. This increase in the non-iron bearing portion of the charge results also in a production loss of 2.2 per cent. Employing current costs for coke, limestone, and conversion, an increase in pig iron cost of $0.265 per gross ton of ore is obtained.

"Of even greater importance is the iron production loss which must be made up by the purchase of high priced open hearth scrap. With scrap selling at about $65 a gross ton, a further penalty of approximately $0.31 per gross ton must be assigned to ore for 1 per cent of excess silica. This shows, then, a total penalty of $0.575 per gross ton of ore for each 1 per cent of excess silica, with about half of this penalty dependent on the spread between pig iron costs and the price of open hearth scrap."

Labrador and other foreign ores are coming to Republic with silica well under the 7.5 to 8 per cent base range. They serve as controls for the silica content of the average ore mixture and permit the use of some higher silica lake ore at no penalty to pig iron production.

• *An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, O.*

How to dial a pair of pants

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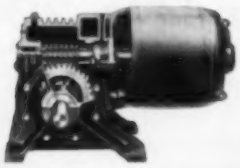
At the touch of a switch, unit rotates and indexes correct order to delivery position. It's fast, accurate and multiplies floor space efficiency. Power is a ½ H.P., 115/230 volt, 60 cycle, 1 phase Master Right Angle Gearmotor.



ANOTHER DRIVE REQUIREMENT MEETS ITS MASTER

You look at a motor application in an ad, and 99 times out of a hundred first thing you say is, "But my problem's different." Here, it's 100 to one you'll be right.

Point is the manufacturers of this fast, efficient and extremely ingenious dry cleaning storing mechanism told Master what they needed. Light, geared-down, steady power, full start, positive stop. And whenever the attendant in a progressive shop so equipped dials your pants, a Master Gearmotor delivers the goods.

And Master can deliver the goods for *you!* Master components can be integrated in any combination to give you the right horsepower, right shaft speed, right mounting features, in a single, efficient compact unit. See Master for your drives!

Motor Ratings	⅛ to 400 H.P. All phases, voltages, frequencies.
Motor Types	Squirrel cage, slip ring, synchronous, repulsion-start induction, capacitor, direct current.
Construction	Open, enclosed, splash-proof, fan-cooled, explosion-proof, special purpose.
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Installation	Horizontal and vertical, with or without flanges and other features.
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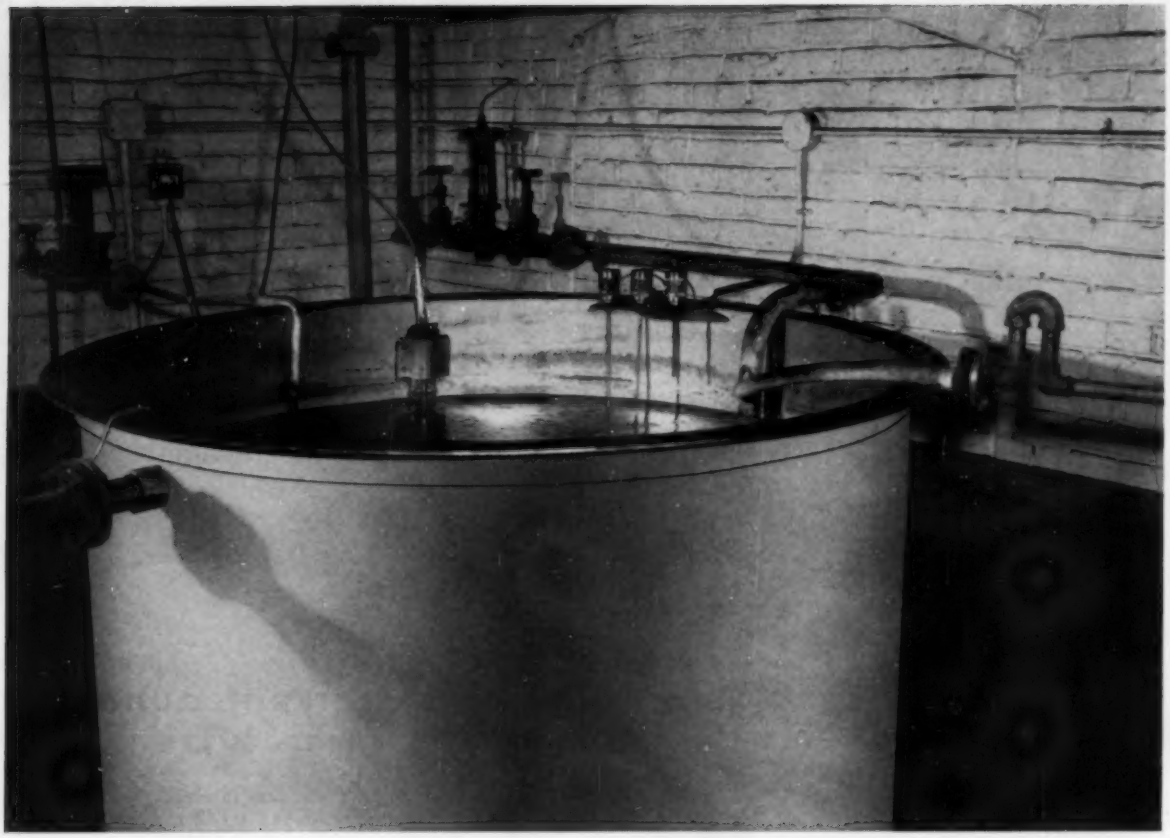

Another plant tames sulphuric acid with *Carpenter* Stainless No. 20 and No. 20Cb

An automatic sulphuric acid dilution system, with Carpenter Stainless No. 20 and No. 20Cb preventing corrosion at critical points, is cutting acid costs and reducing dangerous acid handling for a Tennessee textile plant. Savings with the system in its first year of operation equaled the total initial cost. Carpenter No. 20 and No. 20Cb control corrosion attacks of H_2SO_4 concentrations up to 23% in a cutting tank (shown above), piping and pumps.

Whether you have sulphuric acid solutions or other strong corrosives to handle, see how Carpenter Stainless No. 20 and No. 20Cb can help you cut corrosion costs by keeping acid handling equipment on the line longer.

Write for a copy of the Carpenter Stainless No. 20 and No. 20Cb handbook containing physicals, corrosion resistance and fabrication data.

These super corrosion-resistant alloys are available in tubing, pipe, sheet, plate, bars, strip, wire and billets to meet your exact requirements.

See your nearest Carpenter Distributor for full information and help on your particular application for Carpenter Stainless No. 20 and No. 20Cb.

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Carpenter

Stainless No. 20 & No. 20Cb

Carpenter No. 20 bars, strip, wire and billets are available also from The Carpenter Steel Company, Reading, Pa.

Tape Control Requirements Cited

Airframe builders will take to numerically controlled machines in a big way, says this spokesman. But he points out three areas for special development

JOB SHOP operators stand to gain from three campaigns being waged by aircraft builders.

K. G. Wood, assistant to the manager, facilities engineering, Boeing Airplane Co., Seattle, recently cited need for: Numerically controlled inspection, some standardization on tape or card systems and equipment that will stand up under production conditions and will be easy to run and maintain.

Inspection—Mr. Wood tells about an aluminum contoured test part where "only 14 minutes were required for cutting, but inspection took 12 hours. It took 50 times longer to inspect for quality than to make the part.

"Certainly, here is an area for improvement. The fundamentals of numerical control should soon be incorporated into automatic inspection devices."

Standards — On this point Mr. Wood cautions that "the greater the similarity (of data and memory storage forms), the more rapidly our industry and our subcontractors will accept numerical control."

Although this standardization won't be as complete, nor come as quickly, as some users would like, standardization is bound to happen. (See STEEL, Jan. 21, p. 68.) Certainly, the hundreds of variations in tape and card programming being used or played with will be boiled down to a realistic number of choices, probably four or five.

Others—Mr. Wood also warns that the new equipment must live up to its reputation when it's put into plant production. "For example," he asks, "is numerical control equipment reliable? This, of course, is dominant. Also, is the equipment easily maintained? Is an extensive training program necessary? Is the equipment durable enough for daily factory operation? Is the equipment of high quality or is it breadboard circuitry in fancy cabinets?"

As the aircraft industry asks these questions of machine tool builders, the payoff is bound to extend to small shops which lack the big voice of the aircraft builder, but which bid fair to become the big market for numerical controlled production machines.

Plusses

Mr. Wood is convinced the aircraft industry will take to numerical controls with little hesitation.

"Our products require precise and efficient manufacturing methods. In addition, these methods must not be so rigid that design changes, on which we thrive, cannot be incorporated into the end product in a relatively short time.

"Other aspects," he continues, "are also attractive: For example, we manufacture many parts but nearly always in small lot sizes. This requires frequent changes in machines setups. The flexibility of numerical control, the way a machine can be reset to produce a different part with ease and speed, is valuable to us."

One advantage will be particularly important to the airframe builders. Design engineers have been hard put to come up with reliable, high strength structures that will fit in slim enclosures, and can be made economically. Numerical control will permit the designer to use optimum design without worrying about having to compromise for production. When he wants to use an elliptical part, he'll no longer be tied to circles and straight lines, can specify complex curves without tying up production.

- moves *Inland Steel Products* into special production 4-times faster
- helps cut direct-labor costs 20% for *The Colorado Fuel & Iron Corp.*
- no lost production time in moving *Wyman-Gordon* machine shop
- cuts machine installation cost 90% for *American Type Founders*

Barry Leveling Machinery Mounts let you move machines wherever they are needed, and have them delivering full output *in minutes*—with no delays for drilling, lagging, or shimming.

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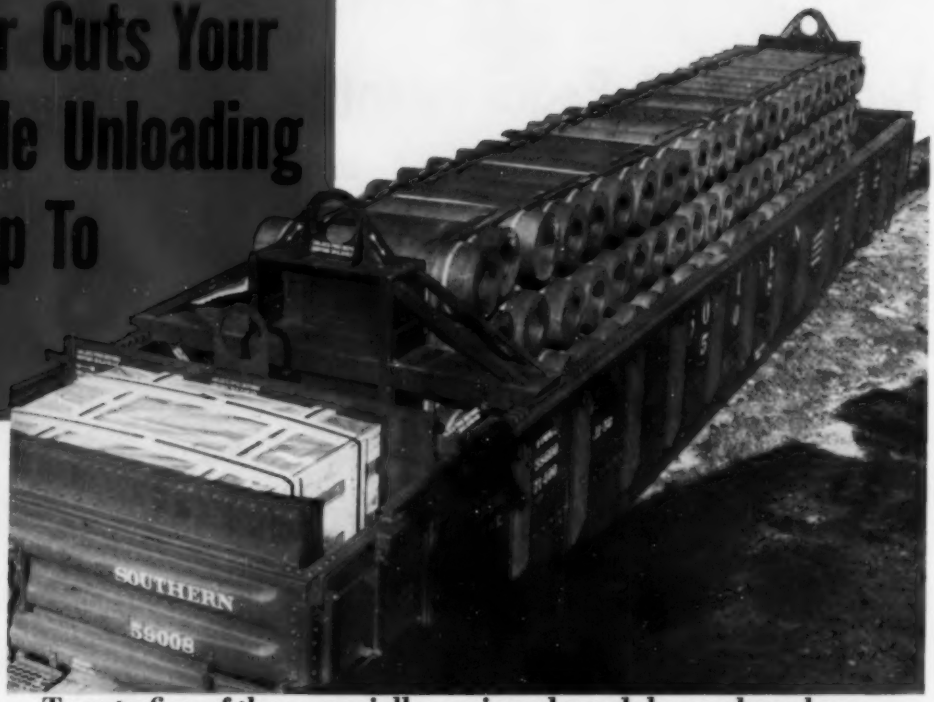
926 PLEASANT ST. WATERTOWN 72, MASS.

This Car Cuts Your Electrode Unloading Costs Up To 80%



Twenty-five of these specially equipped gondola cars have been placed in service by Southern Railway System to handle graphite electrode shipments from the Great Lakes Carbon Corporation plant in Morganton, N. C.

• • •

Exhaustive tests conducted during actual electrode deliveries proved conclusively that the new cars save up to 80% in costs, as compared with other methods.

Three unique devices in the new cars are responsible for these amazing results. An adjustable bulkhead quickly compensates for differences in electrode shipments. At the other end of the car, a self-adjusting bulkhead automatically moves forward to take up any slack that might develop en route. Another movable bulkhead offers safe stowage for the accompanying nipples.

These specially equipped electrode cars effect their savings through substantially reduced labor costs, less crane time and the virtual elimination of dunnage.

We wish to express our appreciation to Southern Railway System for its splendid cooperation in helping us effect these savings for our customers.

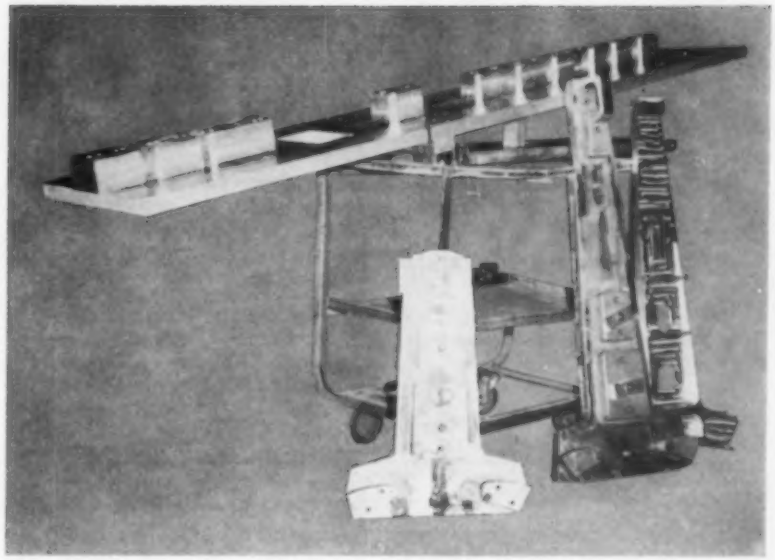
This legend signifies another major Great Lakes Carbon Corporation contribution to electric steel progress.

ELECTRODE GLC® DIVISION

GREAT LAKES CARBON CORPORATION

18 EAST 48TH STREET, NEW YORK 17, N.Y. · OFFICES IN PRINCIPAL CITIES

Its superior machinability, high damping factor, stiffness and fatigue resistance are attracting more users. Compared assembly for assembly, it's competitive pricewise. Here are some case histories



The large sine table and positioning plates are made of magnesium tooling plate. Stock 2 in. thick is stiff, stable and easy to handle

More Work for Magnesium

MORE magnesium was used by civilians last year than ever before. That trend, combined with several new developments, makes this year's prospects brighter still.

Its lightness isn't the only reason. Here are some less often cited factors:

1. It is easily machined. Tools last longer. Compared with similar nonferrous metals, it takes one-third less time to make magnesium parts.

2. It has a high damping factor. Parts can be made thinner and still be as stiff as other metals.

3. It resists fatigue. Magnesium assemblies stand vibration better and require less repair than those made of similar nonferrous metals.

These are a few developments which will play prominent roles in magnesium's growth this year.

1. **Higher Strength Extrusions:** A new higher-strength temper (T51) has been developed for the ZK60A alloy. ZK60XB, made from pellet stock, is being extruded in volume by Dow Chemical Co. in Madison, Ill. It offers a much higher compressive yield strength in extrusions of larger cross section.

2. **Larger Extrusions:** With the completion of the 13,200-ton press at Madison, you can expect some really big examples like these: 28-in. structural shapes, 20-in. integrally stiffened sections and 24-in. tubing. The press is equipped with a 3000-ton piercer.

3. **Wider Application in Aircraft:** The skin of the Chance Vought Crusader (1015 mph) is more than 25 per cent magnesium. More than 300 castings are used internally, many in highly stressed areas.

Tough — Airplane makers have

Piggyback ramps are a natural for magnesium. This one's easily lifted aboard for transport to the next stop

Outlook for Magnesium

Highest peacetime production:	**It will hit 75,000 tons this year, experts predict.**
Increased ingot capacity:	**Dow Chemical Co., Midland, Mich., is upping its output by improving electrolytic cell efficiency. New plants are in the planning stage.**
Increased nonmilitary use:	**With military stockpiling at an end, civilian use currently is about 50 per cent of the total.**

always leaned toward magnesium because of weight savings. Today's missile makers like the new thorium alloys, such as HK31A and HM21CA-T8, that stay tough at 700°F.

Others who have turned to magnesium primarily for its lightness have been surprised by its many secondary benefits. White Sewing Machine Co., Cleveland, chose magnesium because it could make a portable sewing machine the same size as its big one. S. J. Hamlett, product development engineer, says: "We like the easy machining. It's far simpler to tap magnesium than other nonferrous metals."

Transportation — Several firms that build truck bodies have found magnesium a lucrative source of new business. Pickup and delivery vans with magnesium bodies run up impressive annual savings for their owners.

A hatchery runs such a van about 60,000 miles a year. Savings for the period are about $4500 because weight removed from the body is added to the pay load. The van lasts more than two and a half times as long as those of conventional construction.

Savings — According to D. R. Cole, manager, T. A. Brouilette & Son, every 1500 lb you cut from body weight saves the trucker a minimum of 1¼-cents a mile. If he travels 40,000 miles, that's $500.

One of the larger vanmakers (Metropolitan Body Co., Bridgeport, Conn.) is producing magnesium bodies on an assembly line. The firm uses about 400 lb of magnesium in a 1200-lb assembly, and claims that the product is the lightest in the field.

The van, called the Metro-Lite, uses the thick-skinned (monocoque) construction which increases inside room by eliminating supporting members. It uses fewer fasteners and only a third as many parts as conventional bodies. The thick magnesium protects the cargo better than conventional thin skins. Wrinkling is no problem.

Autos—During 1956, carmakers increased their applications of magnesium. Some, like Chrysler Corp., Detroit, used it for flywheel and transmission housings. They reported that the material handled well and wasn't particularly affected by salt or other types of corrosion encountered in driving. New models contain more magnesium parts than ever.

The Volkswagen goes heavy on lighter magnesium parts. Since 1949, the amount of this metal going into these cars annually has increased from 300 to 7000 metric tons. These parts pay off in improved acceleration and fuel economy because they lower the weight-to-horsepower ratio.

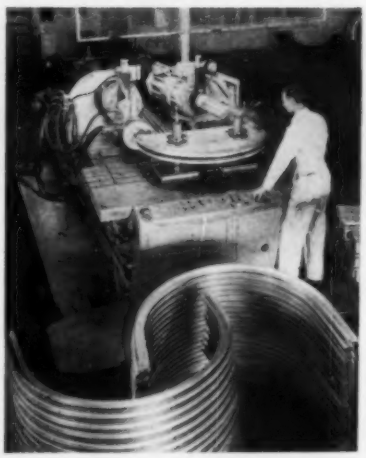
Ludwig C. Boehner, chief engineer for Volkswagen, says that 36 lb of magnesium in the finished car cut total weight about 7 per cent. That seems unimportant until you realize that the saving is concentrated in the aft part of the vehicle. Weight there cuts steering ability. Weight saved there improves the weight-to-horsepower ratio and maneuverability.

Bearings — According to Mr. Boehner, magnesium also has excellent bearing qualities. Camshafts run directly in the crankcase bore without difficulty; engine parts without special inserts wear excellently.

Magnesium expands more than twice as much as steel. Bearing clearances are somewhat larger than those in gray iron. Pounding can be controlled by reinforcing the bearing with stiffeners, webs and ribs.

Laminates—Unless it's painted or otherwise protected, magnesium turns a dull gray. One of the best methods of improving its appearance is to cover it with plastic.

That's what Shwayder Bros. Inc., Denver, does to its Ultralite



The die and filler snake for this Hufford stretch wrap former are made of magnesium. Its nongalling characteristic improves part finish

The portable dictation machine above is 6¼ x 4½ x 2 in. Its maker, Dictaphone Corp., attributes its ruggedness and lightness to magnesium

Samsonite luggage. Magnesium sheet is coated with a bonding agent, then covered with vinyl. The bond is so strong it tears the plastic first, if you try to remove it.

The light metal was selected after a series of tests. The firm says it offers the best combination of dent resistance, toughness and lightness.

Electronics—Now that the Underwriters' Laboratories have rubber-stamped magnesium for electric motors, look for its increasing use in electric parts of all kinds.

Redmond Motors Co., Chicago, makes lightweight, alternating current motors in a variety of fractional horsepowers. J. W. Tweedy, president, points to lower shipping costs in the choice of magnesium.

General Machine Works, Los Angeles, uses tooling plate for die sets. - Die and the part it produces are shown above. Rigidity, lightness and easy machining are the important factors here

"Frames weigh about a pound less on our ¼-hp motor. On a 200-lb appliance, that may seem insignificant, but it enables our customers to save a few cents per motor in shipping costs. Our plant in Ithaca, Mich., for example, ships the lighter motors to Los Angeles for 6 cents less than it cost for the old style. It's worth thousands of dollars to us annually."

Mr. Tweedy also says that increased machine feeds and speeds are important.

Defense—The use of magnesium has kept pace with the expansion of military electronics. To qualify for such uses, metals must withstand these conditions:

1. Temperatures from minus 85 to plus 160°F.

2. Shocks from 5 to 30 times gravity. (The standard test is five blows on each of the six faces of a piece of equipment.)

3. Humidity of 98 per cent at 130°F up to 90 days.

4. Salt tests—in some cases.

Arthur F. Maynard, automation specialist, General Electric Co., Schenectady, N. Y., says that magnesium's good internal damping and its susceptibility to heat treatment offer important advantages to U.S. Air Force engineers. He has designed a slow speed gear unit entirely of magnesium and reports the weight savings are "astonishing." The unit is now a part of GE's air-borne electronic equipment.

A portable, high speed teleprinter for the U.S. Army Signal Corps is made largely of magnesium. The manufacturer, Kleinschmidt Laboratories Inc., Deerfield, Ill., chose the light metal for its weight saving properties, but says that these advantages are more important to the fabricator:

1. Drawability. Because tools and materials are heated, a single draw does as much forming as three when compared with materials which are drawn cold.

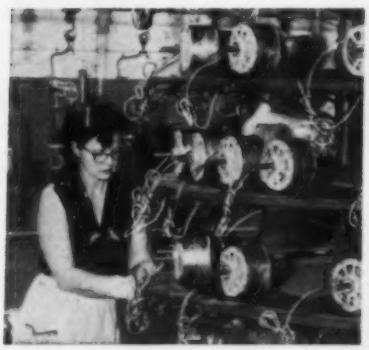
2. Machinability. You can remove more metal per unit of power. Tools last up to five times longer than those on other nonferrous metals.

Tooling Plate — Magnesium is among the most rigid of metals. Basic producers are annealing and flattening it into tooling plate which is used to make dies, jigs and fixtures. One west coast distributor says its sales rose 300 per cent during 1956.

Tooling plate is dimensionally stable when properly sawed or milled. It's easier to machine than other tooling materials, although care must be taken not to stress it during machining. It must be as strain free as possible for maximum usefulness.

A wrought material, tooling plate is dense and shows no porosity during machining. It is also nongalling, an important characteristic for stretch wrap forming dies.

Diecasting—Four diecasting al-



At least one motor maker (Redmond Motors, Chicago) likes magnesium frames. Here are some it makes for fractional units

How Tooling Plate Is Being Used

- Motion picture camera parts.
- Forming dies for double action, hydraulic presses.
- Jigs and fixtures.
- Forming dies for stretch wrap formers.
- Profiling patterns and large sine tables.
- Large welding fixtures.
- Extrusion sizing dies.
- Bases for plaster masters.

loys are available—AM100B, AZ91 A and B, and AM10. The AZ91A is a special, low copper alloy that's good for corrosion resistance.

These alloys cast well, solidify rapidly. There is little tendency to crack when cooling to room temperature: Finished pieces have good surfaces and low porosity (see STEEL, Aug. 13, 1956, p. 102).

Dictaphone Corp., New York, makes an ultrasmall tape recorder which uses transistors. It operates on batteries as well as house current.

The firm decided to die-cast the machine because many of the parts are complex. The process also cut down the amount of machining required.

Magnesium is used because it is nonmagnetic, provides maximum rigidity and dimensional stability with minimum thickness and weight.

Dictaphone designed the tape spool magazine first and built the case around it. The case has a minimum wall thickness of 0.065 in. The magazine is cast in identical halves.

The magnesium gives the magazine an added feature that makes for quick erasures. Although the tape recorder will erase its own tape, a short exposure to a strong magnetic field speeds the process. Ordinary metals tend to block the magnetic flux: An erasing machine would be too large to be economical. Enclosed in magnesium, tape is easily erased in a small magnetic field.

Low conductivity also keeps out hum and static from motors, solenoids and transformers. Some metals tend to pick up stray radiations and transmit them to the tape.

Joining—You can weld magnesium easily with any of the shielded arc, consumable electrode methods. One maker of truck bodies who likes Heliarc finds argon gas the best of several tried. After welding the body, each joint is stress relieved by heating with an acetylene torch to about 550°F.

Model Engineering & Mfg. Inc., Huntington, Ind., a fabricator of magnesium waveguides, recommends a tungsten electrode, alternating current and a blanket of argon. For thin sections, the firm says you need a welding machine with a fine adjustment for current between 10 and 75 amperes: That will hold distortion to a minimum. Annealing fixtures are also recommended.

Storage—How to store magnesium depends on climate and on how soon you expect to use it. Under six months, it keeps well if it's oiled with a mixture of 600W and kerosine; use a chrome pickle (Dow #1) for longer periods.

Don't expect unusual conditions to develop on magnesium in storage: A thin oxide film acts as a protective coating.

You can protect completed assemblies by dipping them in the solution of 600W and kerosine, although a better treatment is a dip in sodium dichromate (Dow #7) which forms a good paint base and doesn't affect tolerances or electrical properties.

No Hazard — Everyone asks about fire. Here is what several authorities have to say:

J. S. Kirkpatrick, vice president, Brooks & Perkins Co., Detroit: "During the many years we've used magnesium, we never had a fire that was serious enough to require the repainting of a single machine."

Frederick W. Roberts, director of engineering and research, Dictaphone Corp., New York: "Today, we have no fear of magnesium."

Mr. Tweedy of Redmond Motors: "The fact that our machinery is operated by women is evidence enough that fire hazard is no factor."

Factory Insurance Association, Hartford, Conn., doesn't object to the storage or machining of magnesium—there's no hike in premiums.

Summation—For the first time in several years, consumption of magnesium may equal production. (Stockpiling in previous years made the difference.) Experts at Dow are anticipating continued increases because of improvements in production efficiency. Plans for several new magnesium plants are under way.

As long as production of metal parts continues to rise, competition for raw materials must increase. Fabricators will be casting about for other metals which offer a way out.

• *An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, O.*

Drilling a magnesium frame for an electric motor. Fires are not a big hazard. Iron chips, graphite, even sand, put them out quickly

VANADIUM-ALLOYS STEEL COMPANY

an improved tungsten

Die Steel for Hot Work

with these definite superiorities:

- High resistance to thermal fatigue
- Longer die life on extrusion dies
- Outperforms standard 9.50% tungsten steels on many applications

WCC—the new tungsten, chromium, cobalt and vanadium hot work die steel—offers higher physical properties at elevated temperatures than standard 9.50% tungsten grades, and is distinguished by greater resistance to heat checking. Its cobalt content steps up hot hardness and tensile strength at high temperatures. Its vanadium content also aids hot hardness and definitely increases resistance to wear and thermal fatigue. • You'll find WCC delivers measurably better performance on a host of jobs where 9.50% tungsten had been considered standard for years . . . just specify this *modern* hot work die steel on that next job coming up!

Write for the new WCC Data Sheet—facts and figures you can use!

Vanadium-Alloys Steel Company

Latrobe, Pennsylvania

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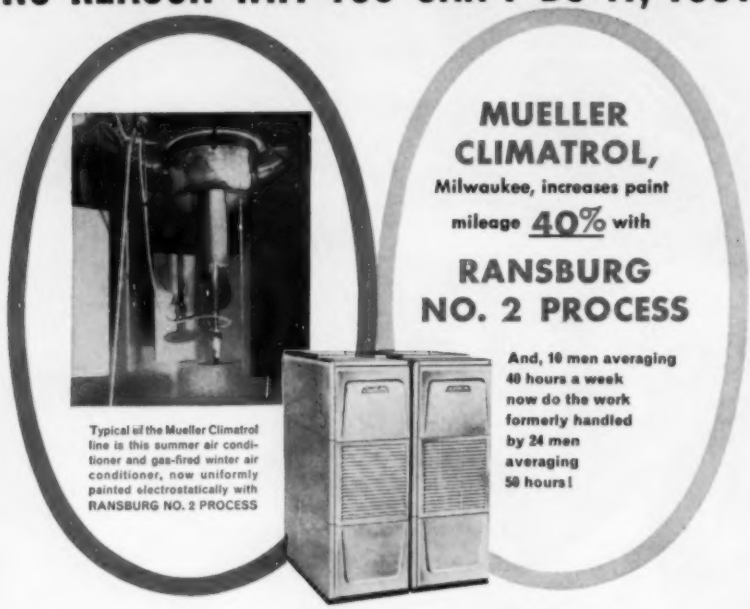
NO REASON WHY YOU CAN'T DO IT, TOO!


MUELLER CLIMATROL,
Milwaukee, increases paint mileage 40% with
RANSBURG NO. 2 PROCESS
Typical of the Mueller Climatrol line is this summer air conditioner and gas-fired winter air conditioner, now uniformly painted electrostatically with RANSBURG NO. 2 PROCESS
And, 10 men averaging 40 hours a week now do the work formerly handled by 24 men averaging 50 hours!

Painting used to be a bottleneck in the manufacture of heating and air conditioning equipment at Mueller Climatrol.

But not any more!

When Mueller modernized its finishing department—replacing hand spray with Ransburg No. 2 Process Electro-Spray—daily production was increased . . . finishing costs were cut . . . and quality of the work was improved.

Annually, Mueller coats over 10 million square feet of sheet metal, so a 40% increase in paint mileage—translated into paint dollars saved—is a sizeable figure. Pointing up other savings, a typical run of 400 furnace casings used to take 200 man hours to clean and hand spray. Mueller does it now in 60 hours!

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Whatever your product, if your production justifies conveyorized painting, chances are one of the Ransburg Electro-Coating Processes can do it better, for less, with improved uniformity and quality of the work. Write for our new brochure which includes numerous examples of both large and small manufacturers of a variety of products who are enjoying the many advantages of *Ransburg Electrostatic Spray Painting.*

Ransburg ELECTRO-COATING CORP.
Indianapolis 7, Indiana
RANSBURG

Plastic Trim Jig

Martin uses vacuum to lock skin sections in tool. Some handwork is eliminated

SHAPED and contoured skin sections are trimmed accurately on a tool developed by engineers at Glenn L. Martin Co., Baltimore.

It's made of plastic and uses a vacuum to hold the skin in place during the trimming. It handles thicknesses up to 0.080 in.

Precision—The skin sections of supersonic missiles like the Martin Matador need precise butt joints. It takes accurate trimming of formed parts (like skin sections) to provide them.

Take the nose section. Martin made a jig out of plastic glass fiber laminate, using a plaster cast as a form. Aluminum skins are placed on the jig and aligned with tooling pins or positioners on the oversized edge. They are securely locked by a vacuum distributed in a network of grooves. A ¼-in. rubber tubing provides a seal at the outer edges.

VACUUM JIG
. . . holds skins accurately

The vacuum is held constant by a venturi pump. A quick disconnect fitting prevents any twisting of the hose during trimming.

Design—The sides and ends of the shaping jig are properly angled to lie flat on the shaper table. Only one adjustment of the blade is necessary for each type part.

Use of the plastic jig has eliminated the hand cutting, fitting and filing formerly required.

The operators in the illustration (above) are trimming an aluminum skin detail for the nose of the TM61 Matador missile.

The jig and skin together weigh 40 lb which makes it easy for operators to handle.

Portable Conveyor Is Used in Dipping Operations

The No. 108 conveyor will handle work up to 2 in. in diameter or 5 lb per cleat. The conveyor illustrated is being used with a centerless grinder requiring a through feed.

As the work comes from the grinder it falls to a cleated belt in the conveyor tank, filled with 6½-gallons of rust preventive.

The work drains as it moves upward. It proceeds to a small apron and then into pans placed at the end of the conveyor. The belt speed is 400 ipm.

The conveyor can be used with or without a rust preventive. The unit is mounted on 3-in. casters so that it can be moved from machine to machine. *Write*: W. A. Whitney Mfg. Co., 622 Race St., Rockford, Ill. *Phone*: 4-6775

Power Squaring Shear Has Back Gage for Fast Settings

A hinged back gage angle on this line of underdrive shears makes possible feeding of long plates. The operator can swing the back gage up and out of the way.

The parallel micrometer back gage adjusts quickly. It gives precise settings for cutting blanks or strips without the use of rules or wrenches.

A light-beam shearing gage is used to cast a sharp, dark shadow line for shearing angular and irregular shapes to scribed lines.

Disappearing adjustable stops are mounted in the dovetail slots of the bed or front brackets to permit feeding sheets without lifting and risk of marring.

An electric foot switch makes it easy to operate the shear from the end of a long sheet or when trimming wide sheets extending the full length of the bed.

There are 59 models in the line with capacities from 16 gage to 1 in. in mild steel. *Write*: Niagara Machine & Tool Works, 683 Northland Ave., Buffalo 11, N. Y. *Phone*: Taylor 4070

Dual Spindle Lathe Turns Large and Small Diameter Work

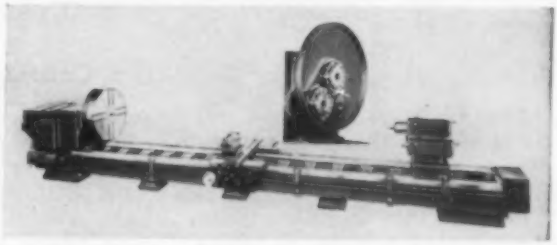
The upper spindle of this lathe (see inset) provides a 60-in. swing over the bed. The lower spindle provides a 40 in. swing.

Position of the spindles makes it easy for the operator to see and reach the point of contact between work and tool.

The lower spindle cuts from 1 2/3 to 46 2/3-threads per inch. Feed range is 0.0054 to 0.150 in. per revolution. Speeds are from 6 to 250 rpm.

The upper spindle cuts 3/5 to 16 4/5-threads per inch. Its feed range is 0.15 to 0.416 in. per revolution. Speeds are from 0.8 to 150 rpm.

A pinion mounted on the lower spindle provides a faceplate drive for the upper spindle. The pinion engages an internal gear in the faceplate. This provides a smooth, powerful drive for large diameter work, as the power to the faceplate is supplied at a radius nearly that of the workpiece.



The lathe can support 15 tons between centers. Beds are made in any required length, and in one piece up to 35 ft between centers. *Write*: Boye & Emmes Machine Tool Co., 81 Caldwell Dr., Cincinnati 16, O. *Phone*: Valley 1-2967

NEW PRODUCTS and equipment

Drill Press

The electromagnetic base of this drill press holds it in position. The operator can run the drill point down to the center punch mark and turn on the automatic feed to let the drill do all the work.

Power feed can be engaged or disengaged at any time during the drilling operation. Depth of cut per revolution can be set according to the size of drill being used.

Holes up to 1¼-in. can be drilled; 1-in. holes can be tapped accurately. *Write*: Portomag Inc., 1511 E. Nine Mile Rd., Ferndale 20, Mich. *Phone*: Lincoln 7-0055

Phosphate Coating

CrysCoat LT, used at temperatures from 120 to 140°F in spray washing machines, converts the surface layer of steel into a zinc phosphate coating.

This fine-grained, uniform coating meets specifications MIL-C-490A, grade I and MIL-C-16232A, type II.

The coating develops rapidly, particularly in deep cavities. *Write*: Oakite Products Inc., 134E Rector St., New York 6, N. Y. *Phone*: Whitehall 3-0940

Furnace Viewer

You can safely observe the travel of the electrode in consumable arc furnaces with this viewer. It fits over the viewing port of the furnace so that the operator can stand outside a concrete barrier and study the image of the electrode on an 8-in. ground glass screen.

The eye can follow the electrode from about 1 ft downward to 10 ft. Image size varies from 1½-in. at a 2-ft working distance to

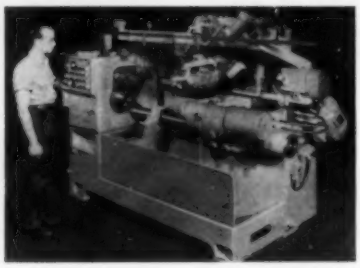
about 6 in. at 4 or 5 ft. *Write*: Special Products Group, Instrument Division, American Optical Co., Buffalo 15, N. Y. *Phone*: Fillmore 4000

Tracer Lathe

Model 14T uses only one template (easily accessible on the front of the machine) for multicycle cuts.

Two roughing cuts, plus semi-finish and finish cuts may be made in one automatic cycle.

An indexing tool turret permits the use of two cutting tools, one for roughing and one for finishing. Shoulder facing tools can be used for squaring operations.



The transmission-type head is available in a two, four or eight speed unit. Proper spindle speed and feed are maintained automatically. *Write*: Sundstrand Tool Co., Rockford, Ill. *Phone*: 2-4477

Dip Coatings

Zinc and cadmium plating operations use the Unichrome dip compounds.

Dry dip compound 1085 gives a bright, clear coating to the zinc plate and is considered ideal for products plated in bulk.

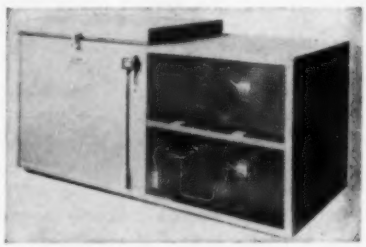
The same properties as the dry dip are furnished by compound 1090, a liquid concentrate.

Dry dip compound 1084 provides corrosion resistant finish. The dip is especially adapted to finishing cadmium plated parts and is also used with zinc plating. When used in low concentrations, the dip is suitable for finishing thin plated bulk work in either hand operated or automatic lines.

Compound 99 is a liquid version of 1084. *Write*: Metal & Thermit Corp., Rahway, N. J. *Phone*: Lexington 2-6300

Low Temperature Cabinet

Model WE-8-125 is an 8-cu-ft industrial freezer for making expansion fittings and thermal contractions and for testing electronic components and the stabilization of metals.



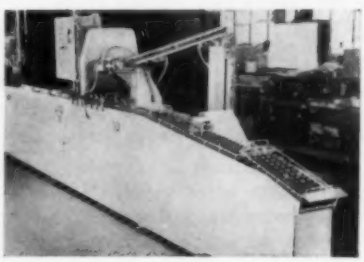
Temperatures of −100°F can be reached in 30 minutes. Lowest possible temperature is −125°F. Parts are placed in four cadmium plated baskets 10 x 10 x 10 in.

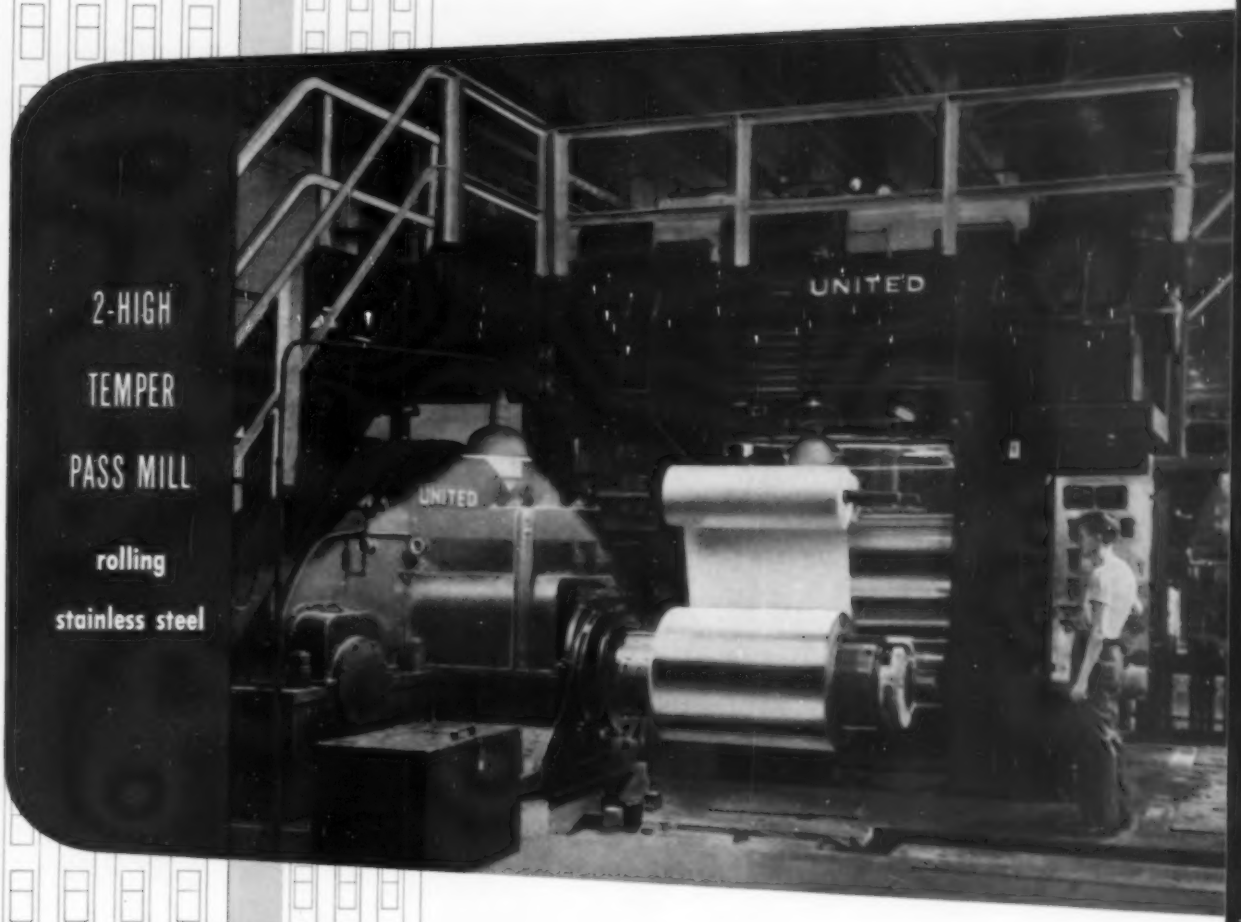
The type of insulation used is sealed against moisture. Refrigeration units are semihermetically sealed. *Write*: Department 297, Webber Engineering Corp., P. O. Box 217, Indianapolis 6, Ind. *Phone*: Melrose 4-5855

Gear Loading

This machine will load 3000 small center-bored pinions an hour into baskets. Standard components are used in the machines which are tailored to a specific job.

The parts are fed to a dropping mechanism through an enclosed track using chain lifts and gravity





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TEMPER
PASS MILL

rolling
stainless steel

STAINLESS STEEL BUILDING ENTRANCE

Designed and Built by

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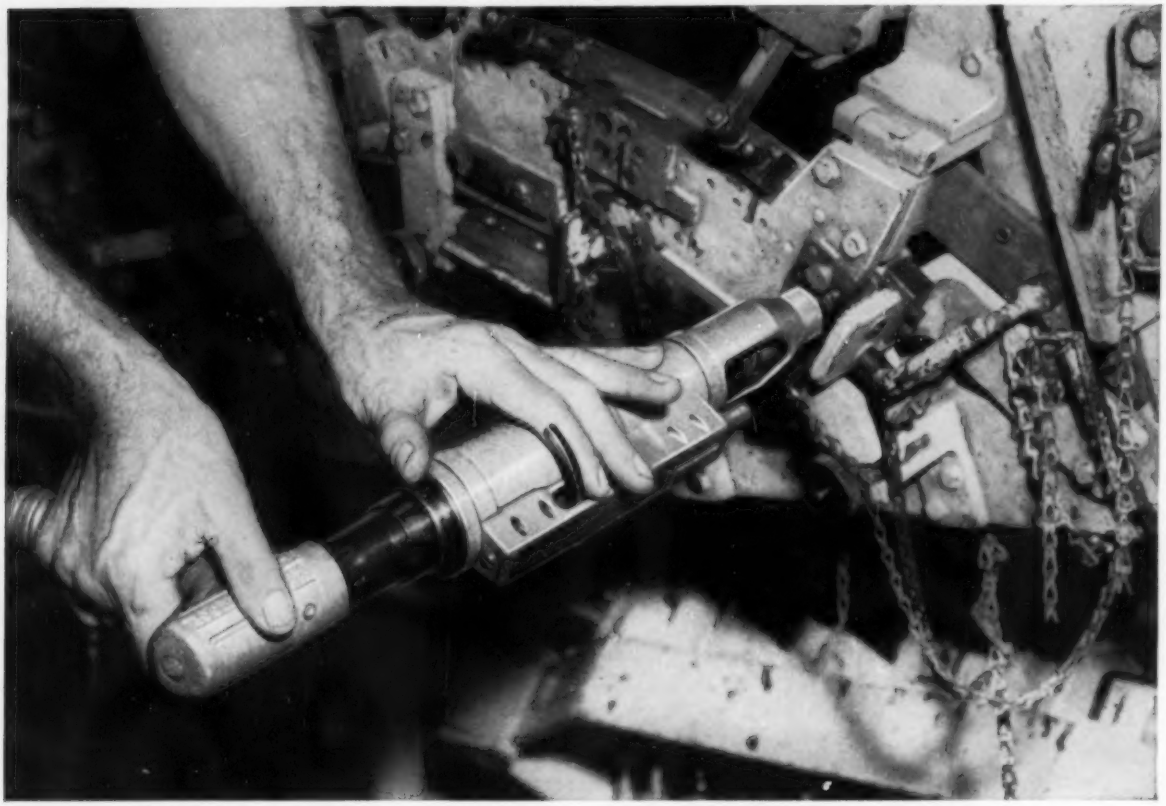


Keller NEW Hard Metals Portable Tool Drills Holes Cleanly at Any Angle

Here is the Keller Tool "K-MATIC"* *portable* production line drilling unit that embodies the best features of an automatic precision drilling machine and the handy hand drill!

This air-powered unit drills clean, true holes in titanium, heat-treated stainless steel and other hard metal alloys—*on the production line.*

Features of the "K-MATIC"

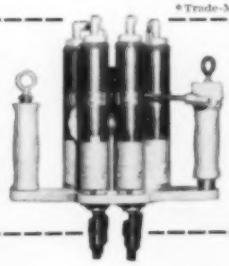
- Handles drills up to 3/8".
- Positive differential lead screw prevents plunging on break-through.
- Drills sandwich construction with uniform penetration.
- Drills so cleanly that reaming is often unnecessary.
- Drill bit returns automatically, quickly.
- Single-lever operation—requires no special operator skill or training.
- Adjustable stop prevents "drilling air."
- Instant bit return prevents damage during drilling cycle.
- Develops up to 1000-lb. thrust.
- Light in weight—"K-MATIC" attachment weighs under 5 lb. . . . is only 12" long, with 1¼" stroke length.

For complete information and specifications, write Gardner-Denver Company—Keller Tool Division, Grand Haven, Michigan.

*Trade-Mark

Another new time saver . . . cost shaver!

Keller Tool multiple-spindle, medium-torque (2 to 24 foot-pounds) nut setter or screw driver. For close bolt center work. Made from stock components to your specifications.



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KELLER TOOL division, Grand Haven, Michigan

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NEW PRODUCTS and equipment

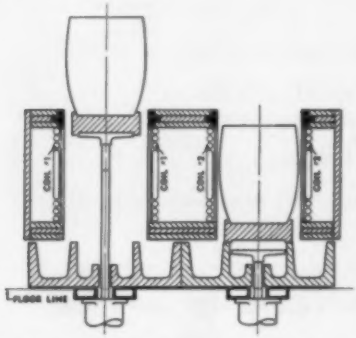
flow. Automatic indexing of baskets actuates the release of parts onto upright prongs in the basket.

If desired, a double or triple dwell of the indexing will stack two or three gears on each prong. *Write*: Gear-O-Mation Division, Michigan Tool Co., 7173 E. McNichols Rd., Detroit 12, Mich. *Phone*: Twinbrook 1-3111

Crucible Furnace

The Push-Out furnace is a unit with two melting positions.

When the charge in one position is ready for pouring, it is raised out of the furnace, and power is transferred to the second melting position.

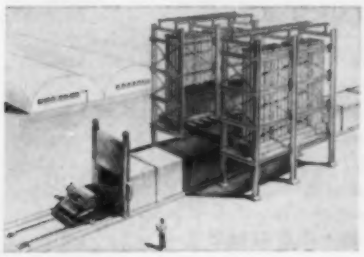


Coils for the furnace never move so there is no need for flexible leads or contacts. *Write*: Inductotherm Corp., 412 Illinois Ave., Delanco, N. J.

Auto Burner

The Smokatron enables scrap yard operators to burn 50 to 150 car bodies a day with no visible smoke and almost no odor. It combines the operation of a scrubber with an electrostatic precipitator.

The basic unit will burn 500 lb of combustible material an hour



Rocker Dumps

RD CARS to any capacity for any track gauge for manual or locomotive hauling. Custom-built.

IT PAYS to insist on EASTON quality when you buy rocker dump cars or trailers. You pay less in the long run. EASTON cars are built to stand up through more years of dependable heavy service.

RD TRAILERS of all types for handling loose bulk materials of any kind.

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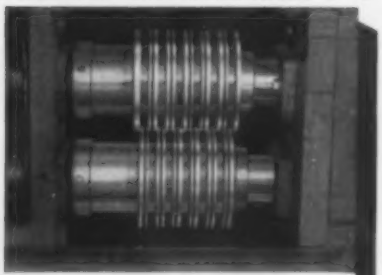

Cut costs 3 ways

Cowles knives reduce set-up time. They are made so accurately they can be assembled on the arbor without shimming. Cowles knives stay on the job longer;— they reduce down-time for re-grinding; and produce straight edged strip with minimum burr avoiding tie-ups in blanking operations.

For maximum economy and satisfaction order your knives and spacers from Cowles, world's largest manufacturer of rotary slitting knives. Prompt delivery. Complete range of sizes and analyses for slitting high and low carbon steels, stainless, alloys, silicon or non-ferrous metals.

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BRASS keeps sales up... manufacturing costs down

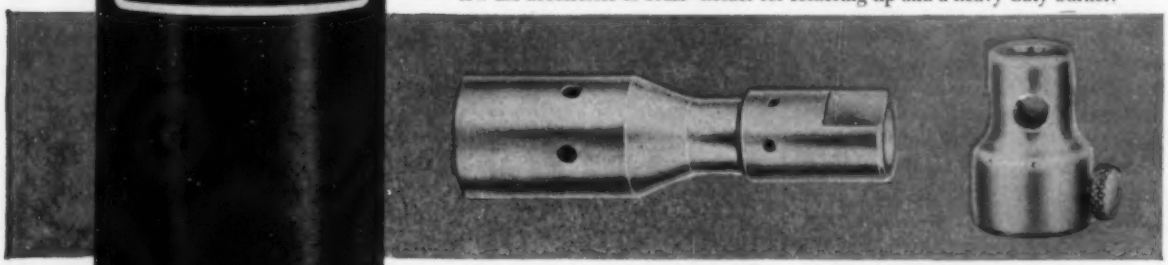
TURNER IS A LONG-TIME USER OF ANACONDA BRASS ROD AND TUBE— GIVES 10 REASONS WHY—

Blow torches built by The Turner Brass Works, Sycamore, Ill., have a reputation for dependable operation and long life. Since 1871, brass has been used consistently in their construction and has built a quality reputation for Turner. Turner prefers Anaconda Brass as a quality metal and looks to The American Brass Company as a quality source of supply. 6673

These are the reasons given:

1. Brass is the quality material needed for the service.
2. Brass is easily machined at high speed, with less tool breakage—manufacturing costs are 15% lower than with other metals.
3. Close tolerances are easily held with brass.
4. Threading holds well—yet accessories are easily screwed on and off.
5. Brass takes a good finish—polishing is easy and economical.
6. Clean, polished brass products have proven high sales appeal.
7. Brass stands up under alternate heating and cooling.
8. Brass resists corrosion—the torches are used on land and sea, throughout the world.
9. Brass gives superior wear on valve seats.
10. Brass has high public acceptance as a quality material.

Turner liquefied petroleum torch No. LP-555, with disposable fuel tank. Below are accessories of brass—holder for soldering tip and a heavy-duty burner.



The American Brass Company, Waterbury 20, Conn.
In Canada: Anaconda American Brass Ltd., New Toronto, Ont.

ANACONDA®

COPPER • BRASS • BRONZE

and eliminate the smoke produced by burning 1000 to 15,000 lb of insulated or impregnated material an hour.

Two or more smoke collectors can be connected together for almost any smoke removal operation. One man can handle most burning operations.

The unit can be installed in a building or placed outside. *Write*: Summer & Co., 555 Buttles Ave., Columbus 8, O. *Phone*: Capital 4-8191

Portable Gage

This dimensional gage and comparator measures variations of 10 millionths to 10 thousandths of an inch. A range switch changes from fine to coarse measurements.

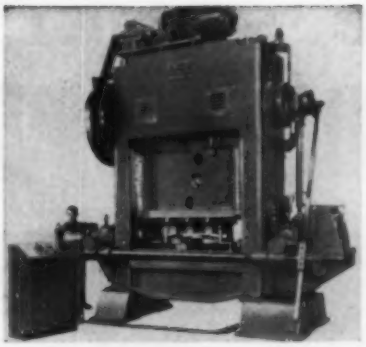
Zero points coincide on the gage's three scales. A wide range centering control permits shifting of zero electrically.

The gage can be used for surface plate or height work and checking setups, runout or alignment of parts or machines. Gaging pressure is about ¾ oz. *Write*: Cleveland Instrument Co. Inc., 735 Carnegie Ave., Cleveland 15, O. *Phone*: Prospect 1-7070

Press

This 200-ton Flexopress has speeds up to 250 strokes a minute.

The slide, fitted with four preloaded ball bearing raceways, contributes to vertical accuracy—the bottom of the ram is parallel to the bed within 0.0005 in. Preloading and antifriction construction assure that this accuracy will be retained for the life of the machine.



Stock is fed accurately by double feed rolls mounted integrally with the press. It is powered by a 25-hp variable speed motor. *Write*: Precision Welder & Flexopress Corp., 3520 Ibsen Ave., Cincinnati 9, O. *Phone*: Elmhurst 1-3300

Patching Cement

This high temperature cement is used to hot patch the side walls of soaking pits.

It can be applied as soon as ingots are removed and the fuel is cut off. The pit can be put back in service immediately after repairs are made.

The cement forms a hard patch which becomes an integral part of the wall. It is as resistant to severe service conditions as the rest of the wall.

Either a high pressure air gun or a long handled paddle can be used to apply the cement. *Write*: Walsh Refractories Corp., 101 Ferry St., St. Louis 7, Mo. *Phone*: Garfield 1-3272

Welding Electrode

Easyarc 10 is an iron powder electrode suited for out of position welding. It is used on tanks with plain or galvanized surfaces, in field construction and in shipyards.

With normal techniques and arc length, the rod deposits a shallow rippled, smooth weld.

The electrode meets AWS-E-6010 specifications. *Write*: Air Reduction Sales Co., division of Air Reduction Co. Inc., 150 E. 42nd St., New York 17, N. Y. *Phone*: Murray Hill 2-6700

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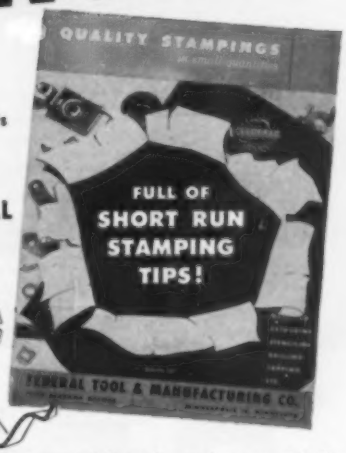

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"QUALITY STAMPINGS IN SMALL QUANTITIES"

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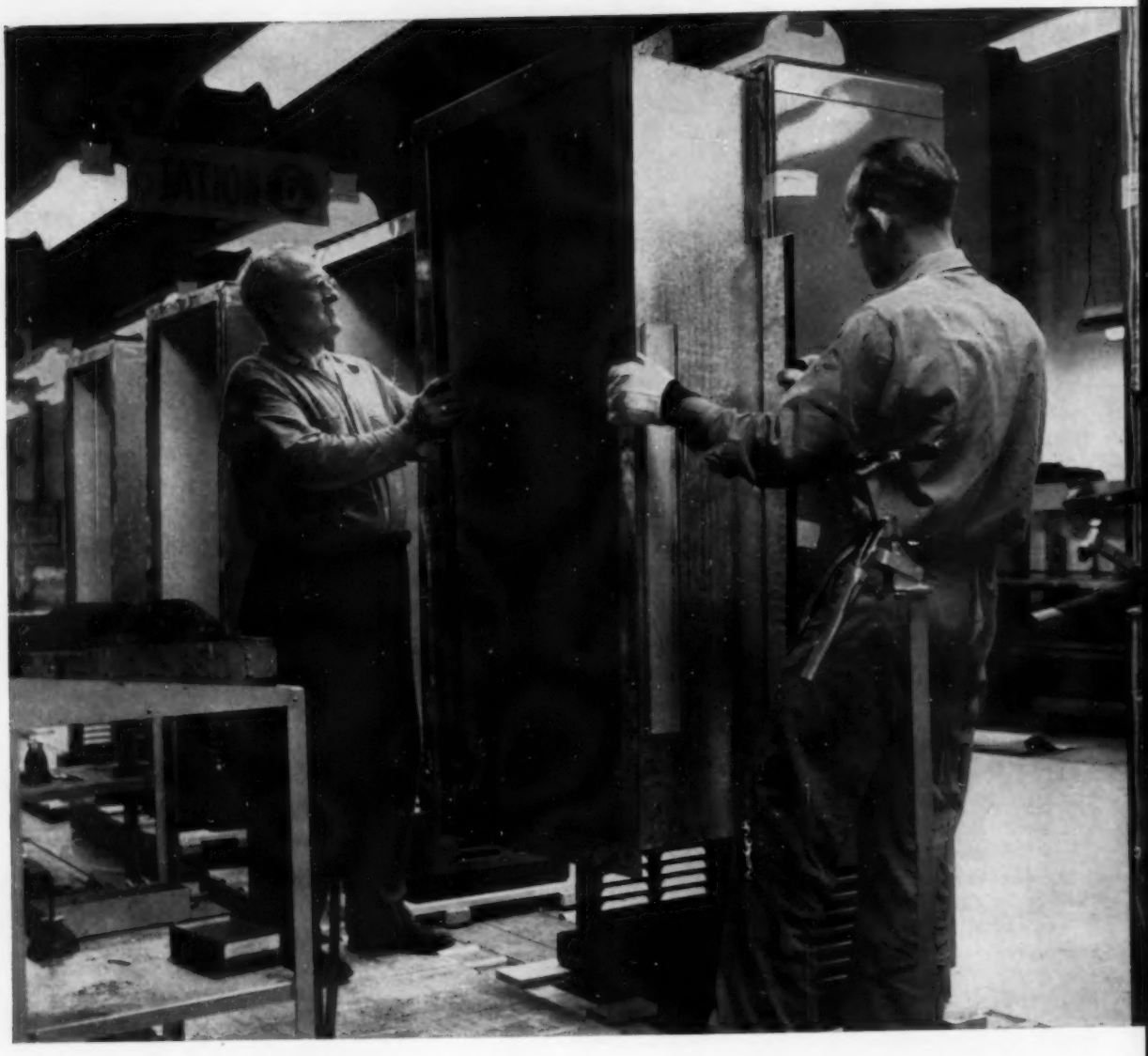
PROVIDE CUSTOM PROTECTION



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Large or small, production item or custom unit—every fabricated sheet metal product presents its share of manufacturing and application problems.

A good case in point is the soft-drink dispenser and cooler, shown being assembled at left. Made by the Ideal Dispenser Company, Columbus, Ohio, these units are in use throughout the world under all climatic conditions.

Republic Continuous Galvanized, used for the liner box, is subject to shearing, blanking, piercing, forming, flanging, soldering, beading, and Pittsburgh Lock Seaming. In spite of this punishment, its tight zinc coating remains undamaged. Ductility assures easy workability, yet the steel is rigid enough to withstand severe use.

Republic Electro Paintlok®, used for the exterior housing, provides an excellent paint-adhering surface even after stamping and forming. "Hot room" tests have proved it the best base material under temperature and humidity variations found in any part of the world at any time of year.

Republic ENDURO® Stainless Steel, used for hinged covers on lift-top dispensers, provides a handsome appearance and is easily kept clean and sanitary for the life of the cooler.

Each of these Republic Steel Sheet Products provides the exact characteristics required to withstand the service expected of the part it forms. The combination provides custom protection for the completed product.

It will pay you to get full information on how Republic's versatile line of sheet products can help solve your production and application problems. Simply contact your Republic Steel Distributor. Or mail coupon, today.

REPUBLIC ELECTRO PAINTLOK retains its excellent paint-gripping surface characteristics after severe forming operations. Produced by electro-galvanizing and a chemical treatment process, Electro Paintlok Sheets are shipped from the mill in prime condition for painting. Even if final finish is scratched through, this coating limits corrosion to the point of damage.

REPUBLIC CONTINUOUS GALVANIZED steel sheet is subject to extreme forming processes during fabrication into the cooler liner box. Its tight, uniform zinc coating will not crack, flake, or peel under any operation permitted by the base metal. Excellent ductility allows easy workability, yet sheet is sufficiently rigid to withstand rugged service.

REPUBLIC ENDURO STAINLESS STEEL provides bright, long-lasting beauty with minimum maintenance. Forming and working qualities of ENDURO permit fabrication on existing equipment. Exceptional strength and toughness plus high heat- and abrasion-resistance keep products looking newer longer. Send coupon for information on Republic ENDURO Stainless Steel and other sheet products.

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NEW literature

Write directly to the company for a copy

Stainless Steels

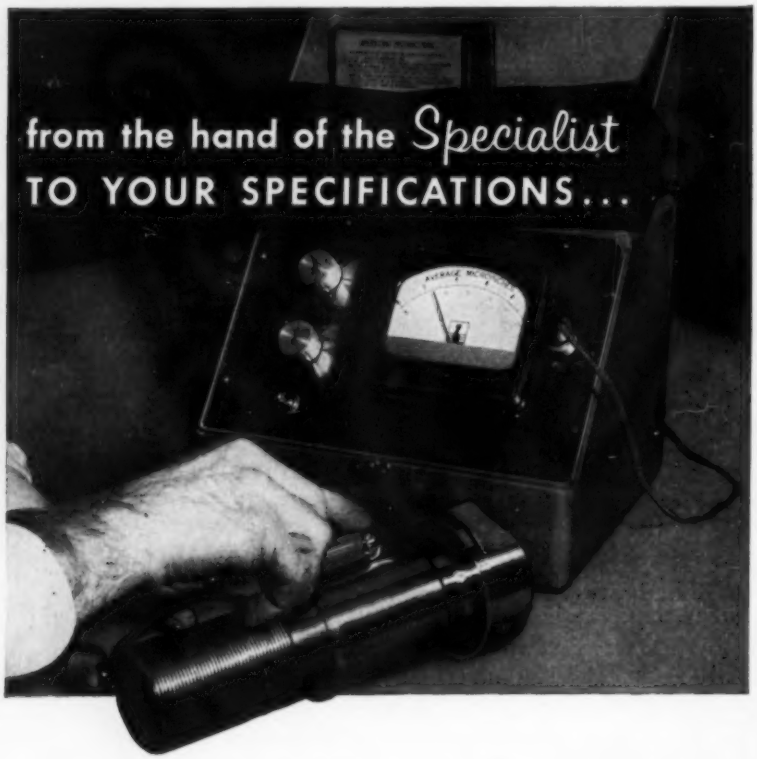
An 8-page bulletin describes intergranular corrosion, mechanical properties, analysis and stress rupture properties of chromium-nickel-manganese stainless steels (types 202, 204 and 204L). Advertising Department, Allegheny Ludlum Steel Corp., 2020 Oliver Bldg., Pittsburgh 22, Pa.

Gear Shaving Cutters

Bulletin CR.56-10, 12 pages, contains cutter specification tables, mounting instructions and data on speeds, feeds, coolants, cutter life, sharpening, storage and cutter repairs. National Broach & Machine Co., 5600 St. Jean Ave., Detroit 13, Mich.

Carbide Blanks

Modified standard cemented carbide blanks and solid cemented carbide cylinders are listed in bulletin GT-314, 35 pages. Metallurgical Products Department, General Electric Co., Detroit 32, Mich.



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In Alloys • Stainless • Carbon • Bronze

The reading on this Surfindicator measures more than just the fine finish on this special bolt. It measures the result of the precision craftsmanship your own specifications receive at Erie Bolt & Nut Company. Producing a wide variety of special fasteners to resist corrosion, extremes in temperature and tensile stresses as specified is our exclusive job . . . has been for almost half a century.

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Lift Truck Operation

Cartoons are used to illustrate the safe handling of lift trucks—bulletin 1214, 24 pages. Hyster Co., 2902 N.E. Clackamas St., Portland 8, Oreg.

Steel Castings

Specifications for commercial, railroad, federal and military use are summarized in this bulletin. Steel Founders' Society of America, 606 Terminal Tower, Cleveland 13, O.

Graphite Tube Furnaces

Bulletin CT-1156 describes furnaces for temperatures up to 5000°F. Harper Electric Furnace Corp., Buffalo, N. Y.

Nylon Resin Parts

Uses of Zytel nylon resin for gears, bearings and bushings is described in a 4-page bulletin. Polychemicals Department, E. I. du Pont de Nemours & Co. Inc., Wilmington 98, Del.

Solvent

This 24-page bulletin describes properties of methylene chloride. Solvent Sales Department, Dow Chemical Co., Midland, Mich.

Tap Drivers

Tension and compression, standard and quick-change tap drivers are described in bulletin 20-50, 8 pages. Scully-Jones & Co., 1901 S. Rockwell St., Chicago 8, Ill.

Power Tools

Catalog 57, 52 pages, describes tools for cutting, shaping, drilling and finishing of wood, metal and plastics. Boice-Crane Co., 1018 W. Central Ave., Toledo 6, O.

Snagging Wheels

Grinding wheels that combine fast cutting action with long life are described in this 12-page bulletin. Simonds Abrasive Co., Tacony & Fraley St., Philadelphia 37, Pa.

Transfer Press

Automatic multiple transfer presses, their operation and advantages are covered in this 16-page bulletin. Baird Machine Co., Stratford, Conn.

Coated Fabrics

This 4-page bulletin lists properties and uses of fabrics coated with silicone rubber, and nylon coated with nylon resin. Connecticut Hard Rubber Co., 407 East St., New Haven 9, Conn.

Steel Subflooring

Bulletin 270, 20 pages, presents a cellular steel subflooring in which

the cells are used as electrical raceways and heating and air conditioning ducts. Advertising Division, Inland Steel Products Co., 4173K W. Burnham, Milwaukee 1, Wis.

Combustion Safeguards

Automatic fire checks which detect, localize and extinguish flashback in a mixture supply line and safety blowouts which prevent flashback in main supply piping are described in bulletin SC-1006, 12 pages. Selas Corp. of America, Dresher, Pa.

Unit Heaters

This 64-page booklet, 9417, contains specifications, operating characteristics and installation and application data for a line of unit heaters. American Blower Corp., Detroit 32, Mich.

Steam Pipe

This 30-page bulletin presents metallurgical considerations of steam piping for high temperature, high pressure service. Tempil° Corp., 132 W. 22nd St., New York 11, N. Y.

Grating

A welded grating in which all bars are load carrying—the primary load bar is a miniature I-beam—is depicted in an 8-page bulletin. Globe Co., 4000 S. Princeton Ave., Chicago 9, Ill.

Truck Couplers

This engineering bulletin describes the various couplers for power industrial trucks. Elwell-Parker Electric Co., 4205 St. Clair Ave., Cleveland 3, O.

Carbide Tool Grinders

Bulletin 260, 16 pages, describes electrolytic, silicon carbide and diamond wheel grinders for carbide tools and chip breakers. Hammond Machinery Builders Inc., 1600 Douglas Ave., Kalamazoo, Mich.

Storage

Use of convertible steel shelving in efficient storage areas is covered in catalog ES-1087, 36 pages. Berger Division, Republic Steel Corp., Canton 5, O.

Ultrasonic Generators

Bulletin DR-2000 describes ultrasonic generators and transducers used in cleaning, plating, drilling and soldering. Acoustica Associates Inc., Glenwood Landing, L. I., N. Y.

Precision Grinders

Bulletin CG-56, 28 pages, depicts standard and single-purpose cylindrical grinding machines. Landis Tool Co., Waynesboro, Pa.

Carbide Drills

Solid carbide drills in fractional, wire gage and letter sizes and solid carbide reamers are presented in this 2-page bulletin. Abrasives Division, Elgin National Watch Co., Elgin, Ill.

Valve Guide

A 24-page bulletin lists tables and information on the selection of valves, boiler mountings and lubricating devices. Lunkenheimer Co., Cincinnati 14, O.

Cap Screws

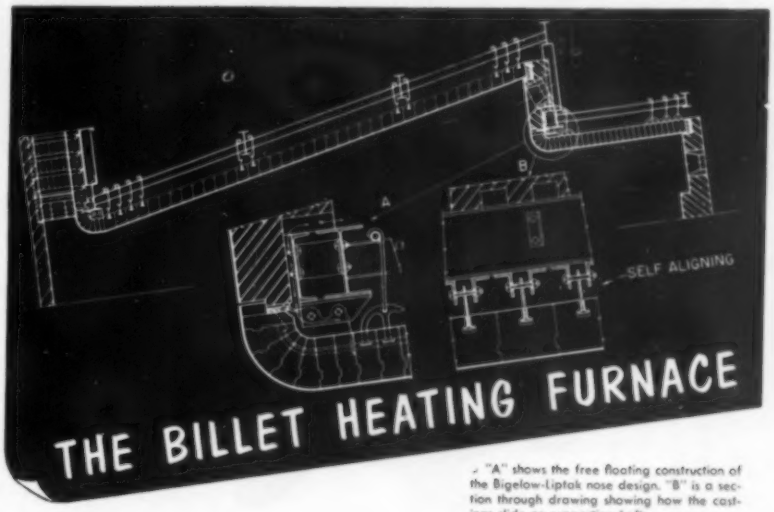
Large socket head screws with big head diameters for assembling large components of heavy machinery are described in a 4-page bulletin. Cleveland Cap Screw Co., Box 579, 2917 E. 79th St., Cleveland, O.

Plate Shear

Here's information on controls, construction and dimensions of a hydraulic shear—bulletin 305, 8 pages. Pacific Industrial Mfg. Co., 848 49th Ave., Oakland 1, Calif.

Thermopiles

Instruments for the conversion of infrared energy into electrical energy suitable for amplification and measurement are described in bulle-



"A" shows the free floating construction of the Bigelow-Liptak nose design. "B" is a section through drawing showing how the castings slide on supporting bolts.

THAT LEADS WITH ITS NOSE...

THE PROBLEM . . .

A new radial nose tile for billet heating furnaces. Previously, cumulative exp.nsions of rigidly hung nose tile in wide metallurgical furnaces had caused mechanical failures of tile and castings . . . plus "shut down" losses of production time.

THE ANSWER . . .

A free floating nose designed by Bigelow-Liptak engineers to control expansion movements at this highly vulnerable point. The free floating feature is only possible with unit-suspension construction . . . another Bigelow-Liptak development.

THE RESULT . . .

Steady, everyday, on-the-line effectiveness.

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Get 22.6% more air per power dollar

Comparative tests show that DeVilbiss compressors deliver up to 22.6% more air per power dollar than most others. Low-friction design makes the big difference—(1) shorter piston stroke (2) slower piston travel (3) ball-bearing-mounted crankshaft (4) full-floating piston pins, and (5) metered oil feed to all bearings! These features not only bring savings in power, but lower maintenance and depreciation costs.

DeVilbiss compressors are available in single- or two-stage, upright or V-type models; ¼ through 15 hp. For full data, call your nearby DeVilbiss supplier.

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NEW LITERATURE

tin CH313, 12 pages. Information Service, Jarrell-Ash Co., 26 Farwell St., Newtonville 60, Mass.

Pinhole Detecter

Bulletin GEA-6520, 4 pages, describes equipment for automatically inspecting fast-moving opaque strip for small holes. General Electric Co., Schenectady 5, N. Y.

NEW BOOKS

Resistance Welding Manual, Volume 1, Third Edition, Resistance Welder Manufacturers' Association, 1900 Arch St., Philadelphia 3, Pa. 350 pages, $3.
This book describes the fundamentals of spot, projection, seam, butt and crosswire welding and the techniques used with various metals.

Arcs in Inert Atmospheres and Vacuum, W. E. Kuhn, John Wiley & Sons Inc., 440 Fourth Ave., New York, N. Y. 188 pages, $7.50.
Status of high current arc technology, arc melting fundamentals, design and operation of arc melting furnaces and chemical applications or arcs are discussed in this book.

Proceedings of the High Temperature Symposium, Public Relations Department, Stanford Research Institute, Menlo Park, Calif. 218 pages, $5.
Methods for reaching high temperatures, materials for containing high temperatures and processes occurring at high temperatures are discussed in the 36 papers included in this volume.

ASTM Standards on Zinc-Coated Iron and Steel Products, American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. 143 pages, $2.25.
Standards, specifications and methods of testing of wire, strands, fencing, sheets, hardware, terne-alloy coated sheets and other products are presented.

Relaxation Properties of Steels and Super-Strength Alloys at Elevated Temperatures, James W. Freeman and Howard R. Voorhees, American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. 104 pages, $4.
Tables and graphic presentations summarize relaxation strengths for low alloyed molybdenum, chromium and vanadium-bearing steels; 12 per cent chromium steels; super-strength alloys; and cast iron.

KEYSTONE Galvanized MB Spring Wire exceeds Automotive Engineers' Specifications for

THE WEATHERHEAD COMPANY

Automotive engineers drew up the specifications for this wire control conduit: Must retain flexibility, resist crushing, hold lubricant and exclude dust and water even when flexed frequently, and give long, trouble-free service.

To more than meet these exacting specifications, The Weatherhead Company, Cleveland, Ohio, one of the leading manufacturers of brake hose, fittings and flexible controls, selected Keystone Galvanized MB Spring Wire.

Weatherhead has found that the superior uniform tensile strength, coiling characteristics, corrosion resistance and extra strength of Keystone Galvanized MB Spring Wire produce quality flexible control cables and assure trouble-free production.

The outstanding qualities of Keystone Galvanized MB Spring Wire are the result of Keystone's exclusive method of galvanizing the wire before it is cold-drawn. The drawing process smooths and hardens the galvanized finish and improves its lasting qualities as well as its appearance.

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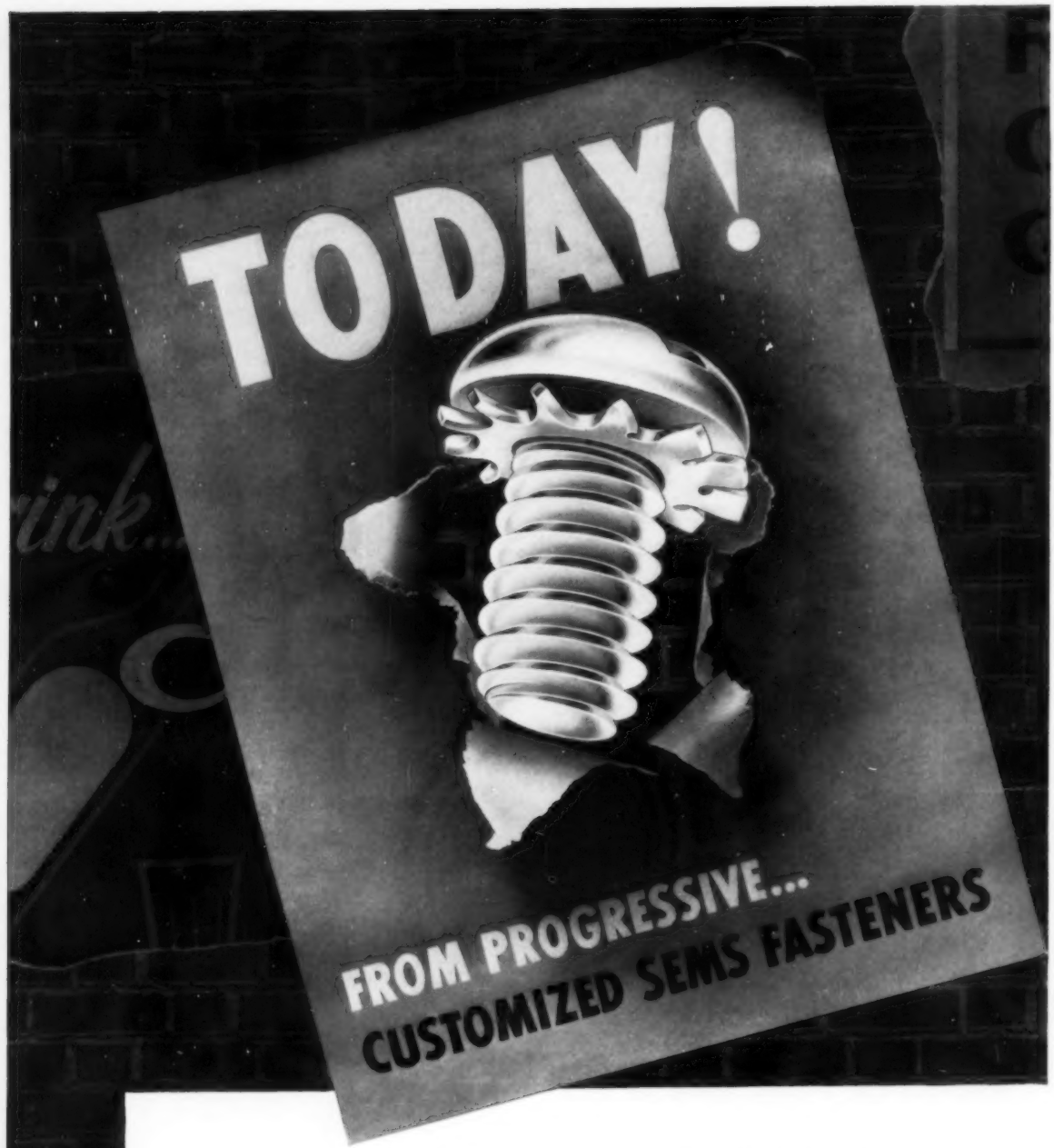

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STEEL

January 28, 1957

Market Outlook

STEEL MILLS are putting themselves in a position to give quick delivery on customers' orders. They are building inventories of semi-finished material, such as billets ahead of bar mills and slabs ahead of sheet mills. This enables mills to roll finished products, like bars and sheets, without first having to make steel in the furnaces and then teem it into ingots.

COMPETITION—Increased steelmaking capacity and a move by customers to buy close to consumption have eased the pressure of steel demand. As a result, steel companies are having to intensify their selling. Each has to be in a position to give quick delivery, lest his competitors get the order.

Consumers, particularly the automobile companies, are insisting that steel arrive on specified dates.

DREAM COME TRUE— As far as deliveries are concerned, more and more customers are climbing into the driver's seat, a spot they have longed for.

The easing in the steel supply comes not so much from cancellations or deferments of orders as from a reduced rate of ordering.

ROLLING ADJUSTMENT— The softer situation is not affecting plates, shapes, tin plate, oil country tubular goods and large diameter line pipe. Quick deliveries can be made on cold-rolled carbon sheets, galvanized sheets, cold-finished bars and wire. The situation could be classed as a rolling adjustment—where all products do not go down in demand at the same time.

Consumers feel they can do without large inventories of steel because the largest user of steel—the auto industry—is going along at only moderate speed, and the three-year labor contract in the steel industry promises a respite from a steel strike this year. Prompt deliveries of many forms of steel are assured.

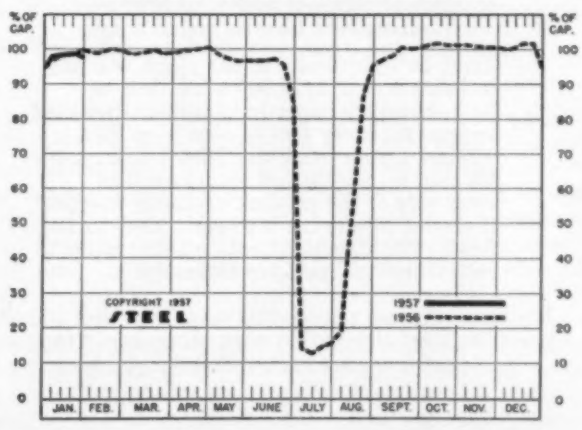
RECORD CONSUMPTION— The lessened demand for steel isn't likely to touch off an inventory reduction—such as we saw in 1954—because steel inventories are not top-heavy. Consumption has been large enough so that little or no steel has been left over for inventory. Steel consumption in the metal fabricating industry, for instance, was higher than ever in November and December.

NEAR CAPACITY—Mills still have enough orders on the books to keep their steelmaking furnaces running near capacity. In the week ended Jan. 27, they operated at 97.5 per cent of capacity. This is a 1-point reduction from the preceding week.

PRICE TRENDS—Steel prices continue to edge upward. In contrast, the price of scrap—a raw material for the steel industry—continues downward. In the week ended Jan. 23, STEEL's price composite on steelmaking scrap was $59.17 a gross ton, a decline of 66 cents.

Prices of some forms of steel imported from western continental Europe rose while others went down. Reductions per ton were $5 on reinforcing bars, $2 on structural angles and $4 on basic bessemer plates. Furring channels went up 15 cents per 1000 ft, barbed wire 19 cents per 82-lb reel and bright common wire nails $11 a ton.

NATIONAL STEELWORKS OPERATIONS



DISTRICT INGOT RATES

(Percentage of Capacity Engaged)

	Week Ended Jan. 27	Change	Same Week 1956	Same Week 1955
Pittsburgh	101.5	+ 2.5	101	82.5
Chicago	97.5	— 0.5*	101.5	87.5
Mid-Atlantic	99	— 1	99	78
Youngstown	100	0	100	88
Wheeling	100	+ 2	98.5	94.5
Cleveland	91.5	— 1*	96	91.5
Buffalo	105	— 2.5	105	100
Birmingham	98	+ 0.5	96.5	74
New England	75	+ 3	90	78
Cincinnati	92.5	— 4.5	96	85
St. Louis	98	— 2.5	99	87.5
Detroit	105.5	+ 2	100	91
Western	105	+ 4	110	88
National Rate	97.5	— 1	99.5	84.5

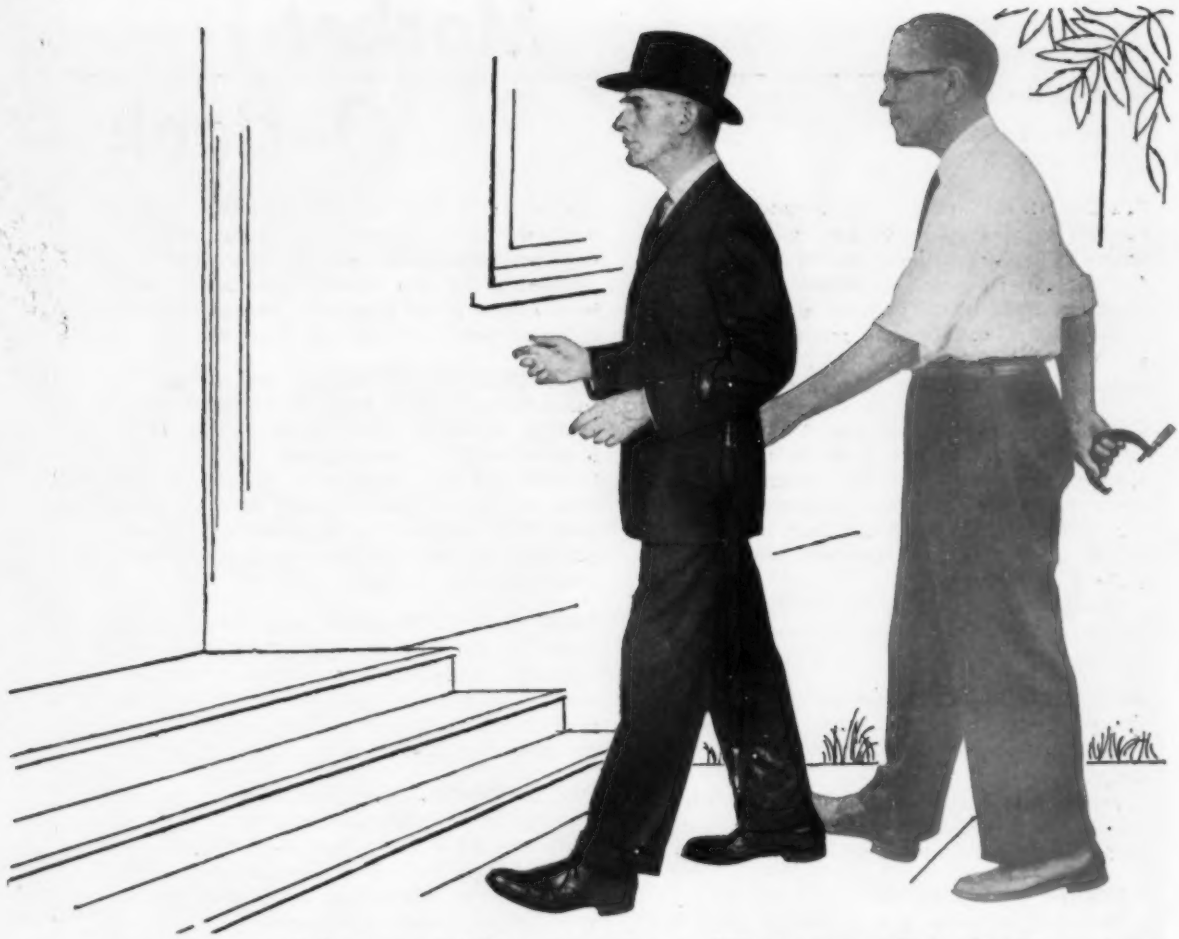
INGOT PRODUCTION‡

	Week Ended Jan. 27	Week Ago	Month Ago	Year Ago
INDEX (1947-1949=100)	155.4†	153.6	144.5	153.9
NET TONS (In thousands)	2,496†	2,467	2,322	2,472

*Change from preceding week's revised rate. †Estimated. ‡Amer. Iron & Steel Institute. Weekly capacity (net tons): 2,559,490 in 1957; 2,461,893 in 1956; 2,413,278 in 1955.

Metalworking Outlook—p. 51

Technical Outlook—p. 89



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Interlake Iron Corp.

Merchant Pig Demand Holds

Strong foreign and domestic buying combined with strikes and repairs at several furnaces will keep supply and demand in balance for at least the next five months

THERE'S ENOUGH merchant pig iron capacity to meet anticipated demand during most of 1957, but seven factors are going to keep supply and demand in delicate balance for some time.

They are: 1. Heavy exports of pig iron. 2. A lengthy strike at Woodward Iron Co., one of the principal suppliers for southern and eastern consumers. 3. The high price of scrap. 4. Near capacity operations in the steel industry. 5. The withdrawal on Jan. 1 of Bethlehem Steel Co. from the market. 6. The eventual shutdown of one of two furnaces at Alan Wood Steel Co. 7. The cutback at Eastern Gas & Fuel Associates' Mystic Iron Works, Everett, Mass.

Big Chunk—From all sections of the country come reports that Japan is in the market for big tonnages of merchant pig. One report mentions 300,000 tons, a sizable chunk of the total supply. It is understood that one producer has offered 100,000 tons and another 50,000 tons. But most producers are spurning the feelers from brokers because they need the iron to supply their regular customers. If Japan succeeds in getting all the pig iron it wants, this will represent an increase of close to 300 per cent over total U.S. exports in 1955.

The strike at Woodward, which began late in November, is having little direct effect on midwest producers, but it is understood that other southern and eastern suppliers are filling the gap. When the strike is settled, there will be some easing of eastern markets, but no end is in sight at present.

The eastern market is feeling the supply pinch more than other areas because of the withdrawal of Bethlehem from the merchant pig market on Jan. 1 and the cutback at Mystic furnace. A strike at the coke ovens in Everett is responsible for the shutdown. Other producers in the area state that all of this has increased demands on their production, but so far they have been able to keep up with orders. While Alan Wood is still operating its small furnace, it soon will be shut down for rehabilitation and expansion. The output of this furnace is going largely to inventory to meet the demand when the furnace shuts down.

Hand in Hand—In the steel industry, the trend is continuing away from dependence on the merchant pig producers for raw iron. But estimates of the amount of merchant iron going to the mills still range as high as 15 per cent. There has been added pressure from the mills and foundries for more pig because of the high price of scrap. Even though the scrap market has softened in the last few weeks, the price is still high enough to make a heavy use of iron in the melt economical. With steel operations scheduled for near capacity through the first quarter, merchant iron salesmen see no immediate letup here. A secondary effect is to keep steel producers from dumping excess iron on the merchant market.

If steel operations ease off, operations at merchant pig iron furnaces are expected to follow, but at a slower rate of decline.

Most merchant pig iron salesmen are looking ahead not more than

four or five months. Over that period, they expect business to be as good as it was last year. Much hinges on what the automotive industry does. If it steps up production, foundries will need more pig iron. On the basis of the predictions for 6.5 million cars in 1957, most producers feel this should be a better year than last. Some easing will show up in the housing market, reducing the demand for soil pipe and other castings. This may be balanced off by an increase in the farm implement field, railroad car building, oil field castings and highway machinery. Castings for the appliance field may be off slightly, but demand for pressure pipe is promising.

Good Estimate — One sales manager of a midwest producer summed it up this way: "There may be some overestimating for certain steel mill items for 1957, but I think our estimate for pig iron will hold. This year will be as good as or better than 1956."

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Pig Iron . . .

Pig Iron Prices, Page 144

Over-all demand for merchant pig iron is picking up, but it is not as good as had been anticipated. Foundry operations are spotty. Automotive business is smaller than expected, but some gray iron and malleable shops are doing well.

Foundries serving the building industry are less active than they have been. Requirements for soil and pressure pipe lag seasonally.

Operators of job foundries report high operations. They are replenishing stocks.

Except for a shortage of southern grades, pig iron supply is adequate.

Metallurgical Coke . . .

Metallurgical Coke Prices, Page 145

Koppers Co. Inc., Pittsburgh, will design and build 174 Koppers-Becker combination coke ovens and auxiliary equipment at Inland Steel Co.'s Indiana Harbor Works, East Chicago, Ind.

Iron Ore . . .

Iron Ore Prices, Page 145

Stocks of iron ore on docks and at furnaces in the U.S. and Canada at the end of November totaled 63,744,139 gross tons, reports the Lake Superior Iron Ore Association. This was an increase of 2,995,067 tons over the 60,749,072 tons held at the end of October.

Stocks of Lake Superior ore increased 3,054,704 tons in November to 50,537,492 tons. Stocks of other U.S. ores were 2,855,980 tons, up 59,519 tons; Canadian ores (other than Lake Superior), 5,826,422 tons, up 169,786 tons; foreign ores (other than Canadian), 4,524,245 tons, off 288,952 tons.

Consumption of ore in November amounted to 11,627,649 gross tons, down 383,462 tons from the 12,011,111 tons used in October. The drop was accounted for solely by the fewer working days in the month.

Ore consumption through the first 11 months of the year was 113,454,560 gross tons. Of this total, 75,050,370 tons were Lake Superior ores (U.S. and Canada); 16,879,780 tons, other U.S. ores;

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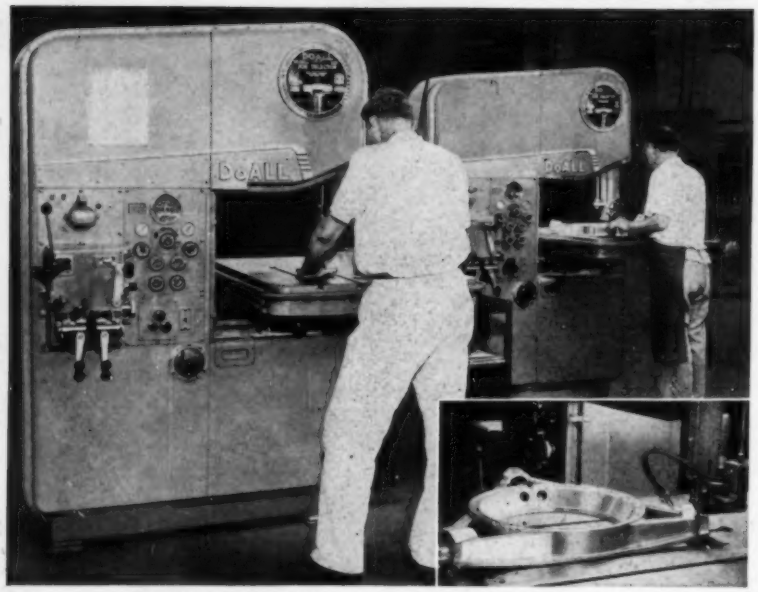

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Economical production of helicopters requires the newest basic tools to perform specialized services in the field of machining. The illustration above shows two DoALL band machines producing the parts that hold the helicopter rotor blades. Formerly, it took 8 hours to shape out one of these parts. With a DoALL, the job is done in 2½ hours. The narrow DoALL saw band cuts directly to the layout line, removing the unwanted metal in a complete usable piece.

Because of tools like this, men can produce helicopters in quantity at a price that makes them practical. The entire economy benefits. Take away the tools, or substitute old fashioned, obsolete ones and there couldn't be as many helicopters, autos, TV's, watches or anything else.

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7,006,210 tons, other Canadian ores; 14,568,570 tons, foreign ores (other than Canada).

Sheets, Strip . . .

Sheet & Strip Prices, Pages 136 & 139

The tone of the sheet market is easy. Current order volume is substantial. But it is disappointing, with auto business falling short of expectations, and some deferments and cancellations being received from warehouses, furniture manufacturers and makers of household durables.

Cancellations are not sizable, but they are more numerous than had been expected. They are principally for cold-rolled and galvanized sheets and bars.

Demand for hot-rolled sheets continues strong, and more mills are enlarging light plate rolling schedules to offset the lag in cold-rolled sheet volume.

Sheetmakers are canvassing customers for second quarter requirements. Some have opened books for the period on all grades. Pending more complete returns, most producers are holding back predictions for the period.

Tubular Goods . . .

Tubular Goods Prices, Page 143

Adjustments in price schedules continue. Colorado Fuel & Iron has revised its extras for an average increase of about 3 per cent, following the lead of other makers.

The National Tube Division, U.S. Steel Corp., raised prices an estimated 3.5 per cent on 14 in. and larger standard and line pipe, effective Jan. 16. Extras for higher grades of line pipe also were revised.

Effective with Jan. 21 shipments, Youngstown Sheet & Tube Co., Youngstown, raised base prices on electricweld and seamless line pipe, grades A or B, in sizes 14-in. OD and larger:

Wall thickness	Lower discount, Higher price
0.250 and .0281 in.	3½-points
0.312 and 0.344 in.	3 points
0.375 in. and heavier	2 points

Extra for all sizes in API 5-LX grades are additionally increased and are now:

Grade	Lower discount, Higher price
X-42	1 point
X-46	2 points
X-52	3 points

Of the various tubular products, only buttweld pipe is in ample supply. The mills can ship most sizes from stock, and distributors' inventories are reported well balanced. While buttweld can be had for March delivery, lapweld, 4 in. and larger, is scarce.

Demand for seamless pipe is heavy, and mill schedules are filled for this quarter with tonnage that will carry over into the next quarter.

Pressure and mechanical tubing are booked through March.

Steel Bars . . .

Bar Prices, Page 137

Carbon bar sellers are opening second quarter order books. But there is little talk of "quotas" or "allocations." Reason: Except for large rounds and flats, chiefly flats, little scarcity of any size or shape appears in prospect.

Hot bar business has been far from dull, but there have been some order cutbacks and deferments. Cancellations have not been drastic, and, actually, bars have been less severely hit in this respect than sheets. The reason is the greater diversity of bar demand.

Plates . . .

Plate Prices, Page 137

U.S. Steel Corp. and its operating divisions, Columbia-Geneva Steel and Tennessee Coal & Iron, increased extras on carbon and low alloy high strength plates, effective Jan. 16. The increases, similar to those put into effect by other producers since the first of the year, result in a net price increase of about 5.5 per cent.

Plate mills are opening second quarter books on nonrated work. Most will have a carry-over. Some are allowing for a month's arrearage in setting up second quarter distribution. They also are allowing for set-asides of 11 per cent for rated work, on which a 90-day lead time on monthly shipments prevails.

Far more tonnage is being offered than the mills can handle. Shipyard requirements have been stepped up, and steady demand is coming from such users as carbuilders. The softer situation in

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Why take less than the latest when you want new milling machines? You can get all the facts on the new TF's from your Kearney & Trecker representative, or write direct to Kearney & Trecker Corp. Mail coupon for new catalog with details on TF Series machines.

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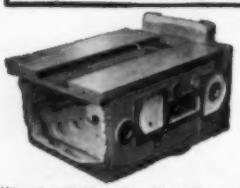

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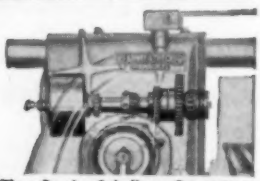

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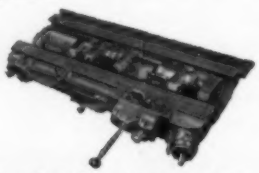

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SYRACUSE 1, N. Y.
Syracuse Supply Co.
314-332 W. Fayette St.

TULSA, OKLA.
White Star Mach. Co.
104 Boulder Bldg.
19 West 10th Street

WICHITA, KAN.
White Star Mach. Co.
301 N. St. Francis

CANADA
MONTREAL
OTTAWA
QUEBEC
TORONTO
WINDSOR
Williams & Wilson Ltd.

some areas of the steel market has not affected plates to any extent.

One Midwest mill has contracts for conversion production of plates through April, and believes that type of business will hold through the first half, possibly longer.

The Claymont Products Department, Colorado Fuel & Iron Corp., Claymont, Del., has increased spun head extras in line with changes by other makers.

Tin Plate . . .

Tin Plate Prices, Page 139

Shipments of metal cans declined in November to 265,338 tons, against 516,542 in October. The cumulative total for the first 11 months of the year was 4,518,-702 tons, against 4,213,248 in the like 1955 period.

Alloy Steel . . .

Effective on Jan. 17, shipments Republic Steel Corp., Cleveland, increased grade extras covering standard alloy steels containing molybdenum and vanadium. The changes, applying to both open-hearth and electric furnace steels, are similar to those put into effect Jan. 12 by Youngstown Sheet & Tube Co., Youngstown (STEEL, Jan. 21, p. 108).

Wire . . .

Wire Prices, Pages 139 & 140

There is a slight stir in the merchant wire trade, particularly in demand from nail jobbers in anticipation of a seasonal build-up in inventories. In general, the merchant products continue sluggish.

Trading in manufacturers wire continues listless. February bookings are slightly heavier, but mill schedules are not filled on heading, spring and manufacturers wire.

Warehouse . . .

Warehouse Prices, Page 144

Warehouse business this month will surpass December's. Distributors look for a further uptrend through March, although they are aware that demand for most products is not as pressing as it was. Plates, shapes and stainless steels are moving to consumers as fast as received.

Distributors are keeping a close watch on inventories now that mills are shipping flat-rolled products and bars more freely. Some deferments of mill shipments have been requested.

In the Philadelphia district, prices have advanced on cold-finished rounds to 9.31 cents, f.o.b. warehouse.

Some Imported Steel Prices Slipping

Prices on most steel products imported from western continental Europe are steady to strong. But there are exceptions: Deformed bars are off 25 cents per 100 lb; structural angles are down 10 cents; and basic bessemer plates are down 20 cents.

But open-hearth plates are practically unobtainable, with premiums substantially higher than they are on the basic bessemer grade.

Oil country pipe is equally scarce, with little or no tonnage being offered.

Sheets, I-beams, merchant bars, hot-rolled bands and wire rods are steady, but advances are noted in barbed wire, common wire nails and furring channels.

Generally Strong—Deliveries on most items have varied little over recent weeks, notwithstanding a generally strong market on the other side. Where products are not available in stock in desired sizes, about four months' delivery is being promised on I-beams and structural angles.

Light plates are available in 40 to 60 days; heavy plates, four months. Sheets, commercial bars, and certain wire products can be had in 40 to 60 days.

Record Set—Steel production totaled 20.66 million tons in Great Britain last year, the highest level ever achieved in that country. Output was 4.4 per cent above production of 19.79 million tons in 1955. Hopes that the year's total would reach 21.3 million tons were dashed by the workers' ban on overtime.

December output averaged 395,-900 tons weekly, 14,000 tons more than the weekly average in December, 1955, and in the first three

new . . . booming . . . stainless steels call for consistent analysis

MANGANESE	99.9% MINIMUM
CARBON	0.004% MAXIMUM
SULPHUR	0.024% MAXIMUM
IRON	0.001% MAXIMUM
HEAVY METALS	0.005% MAXIMUM
PHOSPHORUS	NOT DETECTABLE IN 25 GRAM SAMPLE
SILICON	SPECTROGRAPHIC TRACES ONLY
HYDROGEN	0.015% MAXIMUM

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But—high manganese content also means consistent analysis in this critical alloying agent. The percentage of each impurity must be known and consistent in melt after melt. This calls for the purest commercial manganese available . . . Foote electrolytic manganese. Electromanganese, by trade name, consistently provides 99.9% manganese content in the analysis shown above. If you have a hydrogen problem, even this can be reduced to 7.5 ppm maximum in a *Hydrogen-Removed* grade. Nitrided manganese is available in Foote's high-purity Nitrelmang.® But just as important as consistent analysis is economy. And here Foote's alloying agents enable you to get the necessary manganese content in the most efficient way.

The 17 years' experience in manganese alloying available from Foote's Electromanganese Division is an important first step when you decide to really pursue the growing stainless steel market. A letter will bring a Foote engineer to your desk. Or, you can get further information by writing to our Technical Literature Department, Foote Mineral Company, 411 Eighteen West Chelten Building, Philadelphia 44, Pa.

Foote MINERAL COMPANY

SALES OFFICE: *Electromanganese Division, Knoxville, Tennessee*
RESEARCH LABORATORIES: *Berwyn, Pennsylvania*
PLANTS: *Cold River, N. H.; Exton, Pa.; Kings Mountain, N. C.; Knoxville, Tenn.; Sunbright, Va.*

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weeks it was slightly above that for November, 1956.

This rise was achieved despite reduction in oil supplies since early November .

During the year, the output of pig iron reached 13.17 million tons, an increase of 5.6 per cent over that in 1955, 12.47 million tons.

Imports of scrap and pig iron last year at 1,524,00 tons, were 427,000 tons smaller than in 1955.

Slipping—Although slightly more finished steel was imported last year, 1,004,000 tons, imports have been declining since May.

The most marked reduction was in imports of sheets and tin plate. Sheets accounted for 208,000 tons, against 460,000 in 1955; tin plate was 46,000, against 89,000.

Ship Less Steel in November

Finished steel product shipments totaled 7,431,136 net tons in November, reports the American Iron & Steel Institute. This was off 499,821 from the 7,930,957 tons shipped in October, but was 183,-142 tons greater than the 7,247,994 tons moved in November, 1955.

November shipments brought the total for the first 11 months of the year to 76,187,079 net tons. This was a decline of 986,896 tons compared with total shipments of 77,173,975 ton in the first 11 months of 1955.

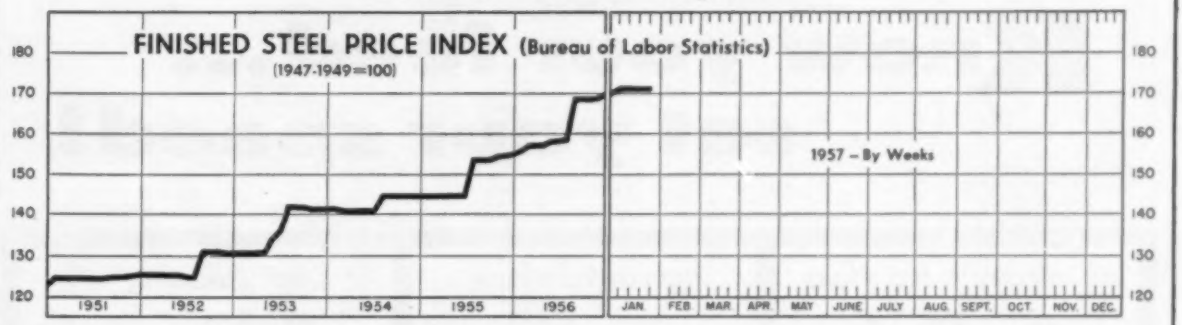
Shipments of plates, heavy structural shapes and steel piling remained high during November. The 774,907 tons of plates shipped ranked the month as the third largest for that product since the end of World War II. The record postwar month was October, 1956, when plate shipments were 795,864 tons.

Heavy structural shape shipments in the month were 521,645 tons, second only to the record 553,255 tons moved in October.

Steel piling shipments set a record at 46,930 ton in November.

The largest categories for receiving finished steel during November were: Warehouses and distributors, 1,480,857 net tons; automotive, 1,377,111; construction, including maintenance and contractors' products, 1,353,191; containers, 485,596; and machinery, industrial equipment and tools, 446,-038 tons.

Price Indexes and Composites



171.6	171.1	169.9	171.1	155.8
Jan. 22, 1957	Week Ago	Month Ago	Jan. Avg.	Year Ago

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended Jan. 22

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard, No. 1	$5.150
Rails, Light, 40 lb	6.567
Tie Plates	6.025
Axles, Railway	9.150
Wheels, Freight Car, 33 in. (per wheel)	57.50
Plates, Carbon	5.900
Structural Shapes	5.667
Bars, Tool Steel, Carbon (lb)	0.480
Bars, Tool Steel Alloy, Oil Hardening Die (lb)	0.585
Bars, Tool Steel, H.R., Alloy, High Speed, W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.60 (lb)	1.274
Bars, Tool Steel, H.R., Alloy, High Speed, W18, Cr 4, V 1 (lb)	1.769
Bars, H.R., Alloy	10.025
Bars, H.R., Stainless, 303 (lb)	0.508
Bars, H.R., Carbon	5.925
Bars, Reinforcing	5.738
Bars, C.F., Carbon	9.610
Bars, C.F., Alloy	13.275
Bars, C.F., Stainless, 302 (lb)	0.533
Sheets, H.R., Carbon	5.945
Sheets, C.R., Carbon	6.789
Sheets, Galvanized	8.220
Sheets, C.R., Stainless, 302 (lb)	0.660
Sheets, Electrical	11.225
Strip, C.R., Carbon	8.843
Strip, C.R., Stainless, 403 (lb)	0.475
Strip, H.R., Carbon	6.000
Pipe, Black, Buttweld (100 ft)	18.376
Pipe, Galv, Buttweld (100 ft)	22.516
Pipe, Line (100 ft)	182.860
Casing, Oil Well, Carbon (100 ft)	178.046
Casing, Oil Well, Alloy (100 ft)	276.870
Tubes, Boiler (100 ft)	45.033
Tubing, Mechanical, Carbon (100 ft)	23.020
Tubing, Mechanical, Stainless, 304 (100 ft)	189.113
Tin Plate, Hot-dipped, 1.25 lb	9.433
Tin Plate, Electrolytic, 0.25 lb	8.133
Black Plate, Canmaking Quality	7.233
Wire, Drawn, Carbon	9.175
Wire, Drawn, Stainless, 430 (lb)	0.630
Bale Ties (bundle)	7.213
Nails, Wire, 8d Common	9.365
Wire, Barbed (80-rod spool)	8.412
Woven Wire Fence (20-rod roll)	20.505

STEEL's FINISHED STEEL PRICE INDEX*

	Jan. 23 1957	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Index (1935-39 av.=100)	225.92	225.92	225.92	209.10	171.92
Index in cents per lb	6.111	6.111	6.111	5.665	4.657

STEEL's ARITHMETICAL PRICE COMPOSITES

Finished Steel NT*	$137.98	$137.98	$137.98	$128.00	$106.32
No. 2 Fdry Pig Iron, GT	62.63	62.63	62.63	58.99	52.54
Basic Pig Iron, GT	62.18	62.18	62.18	58.49	52.16
Malleable Pig Iron, GT	63.41	63.41	63.41	59.77	53.27
Steelmaking Scrap, GT	59.17	59.83	64.50	51.50	43.00

*For explanation of weighted index see STEEL, Sept. 19, 1949, p. 54; of arithmetical price composite, STEEL, Sept. 1, 1952, p. 130.

Comparison of Prices

Comparative prices by districts, in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	Jan. 23 1957	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Bars, H.R., Pittsburgh	5.075	5.075	5.075	4.65	3.70
Bars, H.R., Chicago	5.075	5.075	5.075	4.65	3.70
Bars, H.R., deld, Philadelphia	5.365	5.365	5.35	4.90	4.223
Bars, C.F., Pittsburgh	6.55*	6.55*	6.55*	6.25	4.55
Shapes, Std., Pittsburgh	5.00	5.00	5.00	4.60	3.65
Shapes, Std., Chicago	5.00	5.00	5.00	4.60	3.65
Shapes, deld., Philadelphia	5.31	5.31	5.29	4.88	3.918
Plates, Pittsburgh	4.85	4.85	4.85	4.50	3.70
Plates, Chicago	4.85	4.85	4.85	4.50	3.70
Plates, Coatesville, Pa.	5.25	5.25	5.25	4.80	4.15
Plates, Sparrows Point, Md.	4.85	4.85	4.85	4.50	3.70
Plates, Claymont, Del.	5.70	5.70	5.35	4.80	4.15
Sheets, H.R., Pittsburgh	4.675	4.675	4.675	4.325	3.60-3.75
Sheets, H.R., Chicago	4.675	4.675	4.675	4.325	3.60
Sheets, C.R., Pittsburgh	5.75	5.75	5.75	5.325	4.35
Sheets, C.R., Chicago	5.75	5.75	5.75	5.325	4.35
Sheets, C.R., Detroit	5.75-5.85	5.75-5.85	5.75-5.85	5.325-5.425	4.55
Sheets, Galv., Pittsburgh	6.30	6.30	6.30	5.85	4.80
Strip, H.R., Pittsburgh	4.675	4.675	4.675	4.325	3.75-4.00
Strip, H.R., Chicago	4.675	4.675	4.675	4.325	3.50
Strip, C.R., Pittsburgh	6.85	6.85	6.85	6.25	4.65-5.35
Strip, C.R., Chicago	6.85	6.85	6.85	6.25-6.35	4.90
Strip, C.R., Detroit	6.95	6.95	6.95	6.35	4.85-5.60
Wire, Basic, Pittsburgh	7.20	7.20	7.20	6.60	4.85-5.10
Nails, Wire, Pittsburgh	8.20	8.20	8.20	7.60	5.90-6.20
Tin plate (1.50 lb), box, Pitts.	$9.95	$9.95	$9.95	$9.45	$8.70

*Including 0.35c for special quality

SEMIFINISHED STEEL					
Billets, forging, Pitts. (NT)	$91.50	$91.50	$91.50	$84.50	$66.00
Wire rods, ¼-⅝" Pitts.	5.80	5.80	5.80	5.025-5.375	4.10-4.30

PIG IRON, Gross Ton	Jan. 23 1957	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Bessemer, Pitts.	$63.50	$63.50	$63.50	$59.50	$53.00
Basic, Valley	62.50	62.50	62.50	58.50	52.00
Basic, deld., Phila.	66.26	66.26	66.26	62.16	56.61
No. 2 Fdry, NevilleIsland,Pa.	63.00	63.00	63.00	59.00	52.50
No. 2 Fdry, Chicago	63.00	63.00	63.00	59.00	52.50
No. 2 Fdry, deld., Phila.	66.76	66.76	66.76	62.66	57.11
No. 2 Fdry, Birm.	59.00	59.00	59.00	55.00	48.88
No. 2 Fdry (Birm.) deld. Cin.	66.70	66.70	66.70	62.70	55.49
Malleable, Valley	63.00	63.00	63.00	59.00	52.50
Malleable, Chicago	63.00	63.00	63.00	59.00	52.50
Ferromanganese, Duquesne	255.00†	255.00†	235.00†	205.00†	188.00**

†74-76% Mn, net ton. **75-82% Mn, gross ton, Etna, Pa.

SCRAP, Gross Ton (Including broker's commission)					
No. 1 Heavy Melt, Pittsburgh	$61.50	$62.50	$66.50	$50.50	$44.00
No. 1 Heavy Melt, E. Pa.	59.00	59.00	63.00	55.00	42.50
No. 1 Heavy Melt, Chicago	57.00	58.00	64.00	49.00	42.50
No. 1 Heavy Melt, Valley	63.50	63.50	66.50	54.50	44.00
No. 1 Heavy Melt, Cleve.	60.50	60.50	65.00	52.00	43.00
No. 1 Heavy Melt, Buffalo	61.50	61.50	62.50	47.50	43.00
Rails, Rerolling, Chicago	72.50	82.50	89.50	67.50	53.50
No. 1 Cast, Chicago	48.50	50.50	50.50	49.50	49.00

COKE, Net Ton					
Beehive, Furn, Connlsvl.	$15.00	$15.00	$15.00	$14.125	$14.73
Beehive, Fdry, Connlsvl.	18.00	18.00	18.00	16.50	17.50

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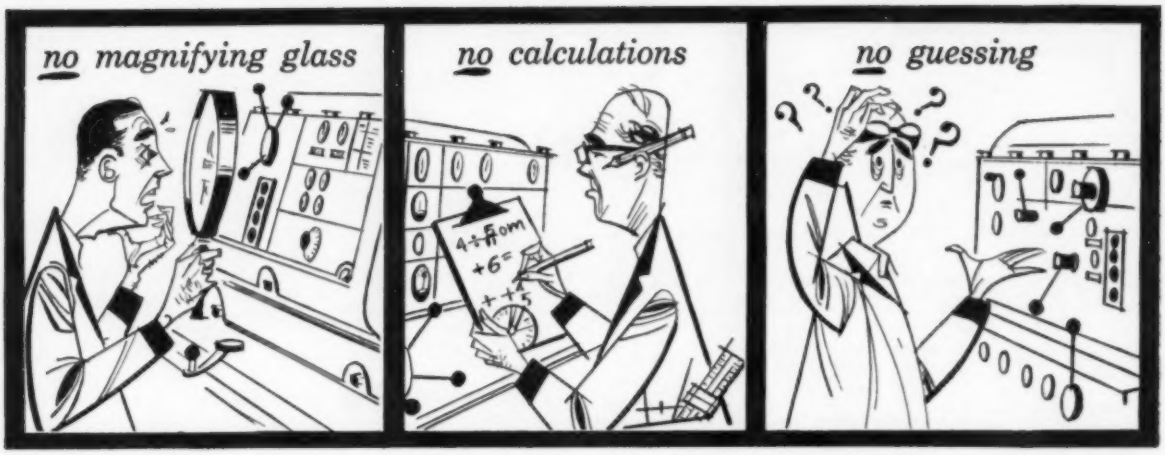

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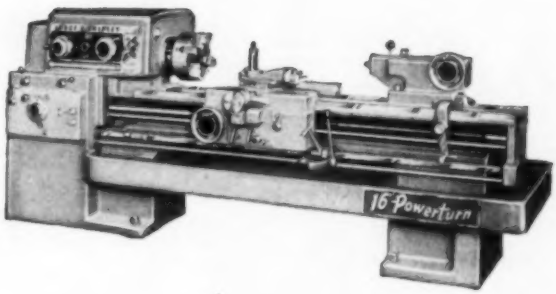
a . . . set work diameter
b . . . read r.p.m. opposite cutting speed
c . . . set levers to automatic indicator lights

This time-saving, fool-proof simplicity is but one feature of New POWERTURN Lathes. Combined with traditional Lodge & Shipley accuracy and rugged strength are many other features for new precision and new operating convenience. New literature . . . ready now . . . tells the complete story: how POWERTURN Lathes are designed to facilitate turning to higher levels of profitable operation. 13, 16 and 20-inch sizes.



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Steel Prices

Mill prices as reported to STEEL, cents per pound except as otherwise noted. *Changes shown in italics.* Code numbers following mill points indicate producing company. Key to producers, page 138; to footnotes, page 140.

SEMIFINISHED

INGOTS, Carbon, Forging (NT)

Munhall,Pa. U5 .....$70.50

INGOTS, Alloy (NT)

Detroit R7 .....$74.00
Houston S5 .....74.00
Midland,Pa. C18 .....74.00
Munhall,Pa. U5 .....74.00

BILLETS, BLOOMS & SLABS Carbon, Rerolling (NT)

Bessemer,Pa. U5 .....$74.00
Bridgeport,Conn. N19 ..79.00
Buffalo R2 .....74.00
Clairton,Pa. U5 .....74.00
Ensley,Ala. T2 .....74.00
Fairfield,Ala. T2 .....74.00
Fontana,Calif. K1 ....83.50
Gary,Ind. U5 .....74.00
Johnstown,Pa. B2 ....74.00
Lackawanna,N.Y. B2 ..74.00
LoneStar,Tex. L6 ....80.00
Munhall,Pa. U5 .....74.00
S.Chicago,Ill. R2, U5..74.00
S.Duquesne,Pa. U5 ...74.00
Sterling,Ill. N15 .....74.00
Youngstown R2 .....74.00

Carbon, Forging (NT)

Bessemer,Pa. U5 .....$91.50
Bridgeport,Conn. N19 ..96.50
Buffalo R2 .....91.50
Canton,O. R2 .....94.00
Clairton,Pa. U5 .....91.50
Conshohocken,Pa. A3 ..96.50
Ensley,Ala. T2 .....91.50
Fairfield,Ala. T2 .....91.50
Fontana,Calif. K1 ....101.00
Gary,Ind. U5 .....91.50
Geneva,Utah C11 .....91.50
Houston S5 .....96.50
Johnstown,Pa. B2 ....91.50
Lackawanna,N.Y. B2 ..91.50
LosAngeles B3 .....101.00
Midland,Pa. C18 .....91.50
Munhall,Pa. U5 .....91.50
Seattle B3 .....105.00
S.Chicago R2, U5, W14 91.50
S.Duquesne,Pa. U5 ....91.50
S.SanFrancisco B3 ...101.00

Alloy, Forging (NT)

Bethlehem,Pa. B2 ..$107.00
Bridgeport,Conn. N19 107.00
Buffalo R2 .....107.00
Canton,O. R2 .....107.00
Conshohocken,Pa. A3 .114.00
Detroit R7 .....107.00
Fontana,Calif. K1 ....128.00
Gary,Ind. U5 .....107.00
Houston S5 .....112.00
Ind.Harbor,Ind. Y1 ..107.00
Johnstown,Pa. B2 ....107.00
Lackawanna,N.Y. B2 .107.00
LosAngeles B3 .....127.00
Massillon,O. R2 .....107.00
Midland,Pa. C18 .....107.00
Munhall,Pa. U5 .....107.00
S.Chicago R2,U5,W14 107.00
S.Duquesne,Pa. U5 ..107.00
Struthers,O. Y1 .....107.00
Warren,O. C17 .....107.00

ROUNDS, SEAMLESS TUBE (NT)

Bridgeport,Conn. N19 $116.50
Buffalo R2 .....111.50
Canton,O. R2 .....114.00
Cleveland,O. R2 .....111.50
Gary,Ind. U5 .....111.50
S.Chicago,Ill. R2,W14 111.50
S.Duquesne,Pa. U5 ..111.50

SKELP

Aliquippa,Pa. J5 ....4.725
LoneStar,Tex. L6 ....5.025
Munhall,Pa. U5 .....4.625
SparrowsPoint,Md. B2 .4.625
Warren,O. R2 .....4.625
Youngstown R2, U5 ..4.625

WIRE RODS

AlabamaCity,Ala. R2 ..5.80
Aliquippa,Pa. J5 .....5.80
Alton,Ill. L1 .....6.00
Buffalo W12 .....5.80
Cleveland A7 .....5.80
Donora,Pa. A7 .....5.80
Fairfield,Ala. T2 .....5.80
Houston S5 .....6.05
IndianaHarbor,Ind. Y1 .5.80
Johnstown,Pa. B2 .....5.80
Joliet,Ill. A7 .....5.80
KansasCity,Mo. S5 ....6.05
Kokomo,Ind. C16 .....5.90
LosAngeles B3 .....6.60
Minnequa,Colo. C10 ....6.05
Monessen,Pa. P7 .....5.80
N.Tonawanda,N.Y. B11.5.80
Pittsburg,Calif. C11 ....6.45
Portsmouth,O. P12 .....5.80
Roebling,N.J. R5 .....5.90
S.Chicago,Ill. R2 .....5.80
SparrowsPoint,Md. B2 ..5.90
Sterling,Ill.(1) N15 ....5.80
Sterling,Ill. N15 .....5.90
Struthers,O. Y1 .....5.80
Worcester,Mass. A7 ....6.10

STRUCTURALS

Carbon Steel Std. Shapes

Ala.City,Ala. R2 .....5.00
Aliquippa,Pa. J5 .....5.00
Bessemer,Ala. T2 .....5.00
Bethlehem,Pa. B2 .....5.05
Birmingham C15 .....5.30
Clairton,Pa. U5 .....5.00
Fairfield,Ala. T2 .....5.00
Fontana,Calif. K1 .....5.75
Gary,Ind. U5 .....5.00
Geneva,Utah C11 .....5.00
Houston S5 .....5.10
Ind.Harbor,Ind. I-2 ....5.00
Johnstown,Pa. B2 .....5.05
KansasCity,Mo. S5 ....5.10
Lackawanna,N.Y. B2 ..5.05
LosAngeles B3 .....5.70
Minnequa,Colo. C10 ....5.30
Munhall,Pa. U5 .....5.00
Niles,Calif. P1 .....5.75
Phoenixville,Pa. P4 ....5.85
Portland,Oreg. O4 .....5.80
Seattle B3 .....5.75
S.Chicago,Ill. U5, W14 .5.00
S.SanFrancisco B3 ....5.65
Sterling,Ill. N15 .....5.00
Torrance,Calif. C11 ....5.70
Weirton,W.Va. W6 .....5.00

Wide Flange

Bethlehem,Pa. B2 .....5.05
Clairton,Pa. U5 .....5.00
Fontana,Calif. K1 .....5.90
IndianaHarbor,Ind. I-2..5.25
Lackawanna,N.Y. B2 ..5.05
Munhall,Pa. U5 .....5.00
Phoenixville,Pa. P4 ....5.85
S.Chicago,Ill. U5 .....5.00

Alloy Std. Shapes

Aliquippa,Pa. J5 .....6.20
Clairton,Pa. U5 .....6.20
Gary,Ind. U5 .....6.20
Houston S5 .....6.30
Munhall,Pa. U5 .....6.20
S.Chicago,Ill. U5 .....6.20

H.S., L.A. Std. Shapes

Aliquippa,Pa. J5 .....7.35
Bessemer,Ala. T2 .....7.35
Bethlehem,Pa. B2 .....7.40
Clairton,Pa. U5 .....7.35
Fairfield,Ala. T2 .....7.35
Fontana,Calif. K1 .....8.10
Gary,Ind. U5 .....7.35
Geneva,Utah C11 .....7.35
Houston S5 .....7.45
Ind.Harbor,Ind. I-2,Y1 7.35
Johnstown,Pa. B2 .....7.40
KansasCity,Mo. S5 ....7.45
Lackawanna,N.Y. B2 ..7.40
LosAngeles B3 .....8.05
Munhall,Pa. U5 .....7.35
Seattle B3 .....8.10
S.Chicago,Ill. U5, W14..7.35
S.SanFrancisco B3 ....8.00
Struthers,O. Y1 .....7.35

H.S., L.A. Wide Flange

Bethlehem,Pa. B2 .....7.40
Ind.Harbor,Ind. I-2 ....7.35
Lackawanna,N.Y. B2 ..7.40
Munhall,Pa. U5 .....7.35
S.Chicago,Ill. U5 .....7.35

PILING

BEARING PILES

Bethlehem,Pa. B2 .....5.05
Lackawanna,N.Y. B2 ..5.05
Munhall,Pa. U5 .....5.00
S.Chicago,Ill. U5 .....5.00

STEEL SHEET PILING

Ind.Harbor,Ind. I-2 ...5.90
Lackawanna,N.Y. B2 ..5.90
Munhall,Pa. U5 .....5.90
S.Chicago,Ill. U5 .....5.90

PLATES

PLATES, Carbon Steel

Ala.City,Ala. R2 .....4.85
Aliquippa,Pa. J5 .....4.85
Ashland,Ky. (15) A10..4.85
Bessemer,Ala. T2 .....4.85
Bridgeport,Conn. N19 ..4.75
Clairton,Pa. U5 .....4.85
Claymont,Del. C22 .....5.70
Cleveland J5, R2 .....4.95
Coatesville,Pa. L7 .....5.25
Conshohocken,Pa. A3 ...4.95
Detroit M1 .....4.95
Ecorse,Mich. G5 .....4.95
Fairfield,Ala. T2 .....4.85
Fontana,Calif.(30) K1 ..5.60
Gary,Ind. U5 .....4.85
GraniteCity,Ill. G4 ....5.05
Harrisburg,Pa. P4 .....5.80
Houston S5 .....4.95
Ind.Harbor,Ind. I-2, Y1..4.85
Johnstown,Pa. B2 .....4.85
Lackawanna,N.Y. B2 ..4.85
LoneStar,Tex. L6 .....5.20
Minnequa,Colo. C10 ....5.70
Munhall,Pa. U5 .....4.85
Newport,Ky. A2 .....4.85
Pittsburgh J5 .....4.85
Riverdale,Ill. A1 .....4.85
Seattle B3 .....5.75
Sharon,Pa. S3 .....4.85
S.Chicago,Ill. U5, W14 .4.85
SparrowsPoint,Md. B2 ..4.85
Steubenville,O. W10 ....4.85
Warren,O. R2 .....4.85
Weirton,W.Va. W6 .....4.85
Youngstown R2, U5, Y1 4.85

PLATES, Carbon Abras. Resist.

Claymont,Del. C22 .....6.20
Fontana,Calif. K1 .....6.75
Geneva,Utah C11 .....6.00
Johnstown,Pa. B2 .....5.65
SparrowsPoint,Md. B2 ..5.65

PLATES, Wrought Iron

Economy,Pa. B14 ....11.128

Plates, High-Strength Low-Alloy

Aliquippa,Pa. J5 .....7.25
Bessemer,Ala. T2 .....7.25
Clairton,Pa. U5 .....7.25
Claymont,Del. C22 .....7.55
Cleveland J5, R2 .....7.25
Coatesville,Pa. L7 .....7.55
Conshohocken,Pa. A3 ...7.25
Ecorse,Mich. G5 .....7.35
Fairfield,Ala. T2 .....7.25
Fontana,Calif.(30) K1 ..8.00
Gary,Ind. U5 .....7.25
Geneva,Utah C11 .....7.25
Houston S5 .....7.35
Ind.Harbor,Ind. I-2, Y1 7.25
Johnstown,Pa. B2 .....7.25
Munhall,Pa. U5 .....7.25
Pittsburgh J5 .....7.25
Seattle B3 .....8.15
Sharon,Pa. S3 .....7.25
S.Chicago,Ill. U5, W14 .7.25
SparrowsPoint,Md. B2 ..7.25
Warren,O. R2 .....7.25
Youngstown U5, Y1 ....7.25

PLATES, Alloy

Bridgeport,Conn. N19 ..6.55
Claymont,Del. C22 ....6.85
Coatesville,Pa. L7 ....6.95
Fontana,Calif.(30) K1 ..7.60
Gary,Ind. U5 .....6.85
Houston S5 .....6.95
Ind.Harbor,Ind. Y1 ....6.85
Johnstown,Pa. B2 .....6.85
Munhall,Pa. U5 .....6.95
Newport,Ky. A2 .....6.85
Pittsburgh J5 .....6.85
Seattle B3 .....7.75
Sharon,Pa. S3 .....6.85
S.Chicago,Ill. U5, W14 .6.85
SparrowsPoint,Md. B2 ..6.85
Youngstown Y1 .....6.85

FLOOR PLATES

Cleveland J5 .....5.925
Conshohocken,Pa. A3 ..5.925
Harrisburg,Pa. P4 ....6.275
Ind.Harbor,Ind. I-2 ...5.925
Munhall,Pa. U5 .....5.925
S.Chicago,Ill. U5 .....5.925

PLATES, Ingot Iron

Ashland c.l. (15) A10 .5.10
Ashland l.c.l. (15) A10 .5.60
Cleveland c.l. R2 .....5.60
Warren,O. c.l. R2 .....5.60

BARS

BARS, Hot-Rolled Carbon (Merchant Quality)

Ala.City,Ala.(9) R2 ..5.075
Aliquippa,Pa.(9) J5 ..5.075
Alton,Ill. L1 .....5.275
Atlanta(9) A11 .....5.575
Bessemer,Ala.(9) T2 ..5.075
Birmingham(9) C15 ..5.375
Bridgeport,Conn. N19 ..5.30
Buffalo(9) R2 .....5.075
Clairton,Pa. U5 .....5.075
Cleveland(9) R2 .....5.075
Ecorse,Mich.(9) G5 ...5.175
Emeryville,Calif. J7 ...5.85
Fairfield,Ala.(9) T2 ..5.075
Fairless,Pa.(9) U5 ....5.225
Fontana,Calif.(9) K1 ..5.775
Gary,Ind.(9) U5 .....5.075
Geneva,Utah(9) C11 ...5.175
Houston(9) S5 .....5.325
Ind.Harbor(9) I-2, Y1 .5.075
Johnstown,Pa.(9) B2 ..5.075
Joliet,Ill. P22 .....5.575
KansasCity,Mo.(9) S5 .5.325
Lackawanna(9) B2 .....5.075
LosAngeles(9) B3 .....5.775
Milton,Pa.(23) M18 ...5.425
Minnequa,Colo. C10 ...5.525
Niles,Calif. P1 .....5.85
N.Tonawanda,N.Y.(9)B11 5.075
Pittsburg,Calif.(9) C11.5.775
Pittsburgh(9) J5 .....5.075
Portland,Oreg. O4 .....5.85
Seattle B3, N14 .....5.825
S.Ch'c'go(9)R2,U5,W14 5.075
S.Duquesne,Pa.(9) U5 .5.075
S.SanFran.,Calif.(9) B3 5.825
Sterling,Ill.(1) N15 ...5.075
Sterling,Ill. N15 .....5.175
Struthers,O. Y1 .....5.075
Torrance,Calif.(9) C11 .5.775
Weirton,W.Va.(9)W6 ...5.075
Youngstown(9) R2, U5 5.075

BARS, H.R. Loaded Alloy (Including leaded extra)

Warren,O. C17 .....7.125

BARS, Hot-Rolled Alloy

Bethlehem,Pa. B2 .....6.125
Bridgeport,Conn. N19 ..6.20
Buffalo R2 .....6.125
Canton,O. R2 .....6.125
Clairton,Pa. U5 .....6.125
Detroit R7 .....6.125
Ecorse,Mich. G5 .....6.225
Fairless,Pa. U5 .....6.275
Fontana,Calif. K1 .....7.175
Gary,Ind. U5 .....6.125
Houston S5 .....6.375
Ind.Harbor,Ind. I-2,Y1 6.125
Johnstown,Pa. B2 .....6.125
KansasCity,Mo. S5 ....6.375
Lackawanna,N.Y. B2 ..6.125
LosAngeles B3 .....7.175
Massillon,O. R2 .....6.125
Midland,Pa. C18 .....6.125
S.Chicago R2,U5, W14 6.125
S.Duquesne,Pa. U5 ....6.125
Struthers,O. Y1 .....6.125
Warren,O. C17 .....6.125
Youngstown U5 .....6.125

BARS & SMALL SHAPES, H.R. High-Strength Low-Alloy

Aliquippa,Pa. J5 .....7.425
Bessemer,Ala. T2 .....7.425
Bethlehem,Pa. B2 .....7.425
Bridgeport,Conn. N19 ..7.50
Clairton,Pa. U5 .....7.425
Cleveland R2 .....7.425
Ecorse,Mich. G5 .....7.525
Fairfield,Ala. T2 .....7.425
Fontana,Calif. K1 .....8.125
Gary,Ind. U5 .....7.425
Houston S5 .....7.675
Ind.Harbor,Ind. Y1 ...7.425
Johnstown,Pa. B2 .....7.425
KansasCity,Mo. S5 ....7.675
Lackawanna,N.Y. B2 ..7.425
LosAngeles B3 .....8.125
Pittsburgh J5 .....7.475
Seattle B3 .....8.175
S.Chicago,Ill. U5, W14 7.425
S.Duquesne,Pa. U5 ....7.425
S.SanFrancisco B3 ....8.175
Struthers,O. Y1 .....7.425
Youngstown U5 .....7.425

BAR SIZE ANGLES; H.R. Carbon

Bethlehem,Pa.(9) B2 ..5.225
Houston S5 .....5.325
KansasCity,Mo. S5 ....5.325
Lackawanna(9) B2 ....5.075
Sterling,Ill. N15 .....5.175
Sterling,Ill.(1) N15 ..5.075

BAR SIZE ANGLES; S. Shapes

Aliquippa,Pa. J5 .....5.075
Atlanta A11 .....5.575
Joliet,Ill. P22 .....5.10
Niles,Calif. P1 .....5.85
Pittsburgh J5 .....5.075
Portland,Oreg. O4 .....5.85
SanFrancisco S7 .....5.95

BAR SHAPES, Hot-Rolled Alloy

Clairton,Pa. U5 .....6.20
Gary,Ind. U5 .....6.20
Houston S5 .....6.45
KansasCity,Mo. S5 ....6.45
Youngstown U5 .....6.20

BARS, C.F. Loaded Alloy (Including leaded extra)

Ambridge,Pa. W18 ....9.475
BeaverFalls,Pa. M12 ..9.475
Chicago W18 .....9.475
Cleveland C20 .....9.475
LosAngeles S30 .....11.10
LosAngeles P2 .....11.00
Monaca,Pa. S17 .....9.225
Newark,N.J. W18 ....9.65
Warren,O. C17 .....9.475

BARS, Cold-Finished Carbon

Ambridge,Pa. W18 .....6.85
BeaverFalls,Pa. M12,R2 6.85
Bridgeport,Conn. N19 ..7.20
Buffalo B5 .....6.90
Camden,N.J. P13 .....7.30
Carnegie,Pa. C12 .....6.85
Chicago W18 .....6.85
Cleveland A7, C20 ....6.85
Detroit B5, P17 .....7.05
Detroit R7 .....6.85
Donora,Pa. A7 .....6.85
Elyria,O. W8 .....6.85
FranklinPark,Ill. N5 ....6.85
Gary,Ind. U5 .....6.85
GreenBay,Wis. F7 .....6.85
Hammond,Ind. L2, M13 6.85
Hartford,Conn. R2 .....7.35
Harvey,Ill. R5 .....6.85
LosAngeles(49) B30 ....8.30
LosAngeles R2 .....*8.75*
LosAngeles P2 .....8.30
Mansfield,Mass. B5 ....7.40
Massillon,O. R2, R8 ....6.85
Midland,Pa. C18 .....6.85
Monaca,Pa. S17 .....6.85
Newark,N.J. W18 .....7.30
NewCastle,Pa.(17) B4 ..6.85
Pittsburgh J5 .....6.85
Plymouth,Mich. P5 .....7.10
Putnam,Conn. W18 .....7.40
Readville,Mass. C14 ....7.40
S.Chicago,Ill. W14 .....6.85
SpringCity,Pa. K3 .....7.30
Struthers,O. Y1 .....6.85
Waukegan,Ill. A7 .....6.85
Youngstown F3, Y1 ....6.85

BARS, Cold-Finished Carbon (Turned and Ground)

Cumberland,Md.(5) C19.6.10

BARS, Cold-Finished Alloy

Ambridge,Pa. W18 ....8.325
BeaverFalls,Pa.M12,R2 8.325
Bethlehem,Pa. B2 .....8.325
Bridgeport,Conn. N19 ..8.475
Buffalo B5 .....8.325
Camden,N.J. P13 .....8.50
Canton,O. T7 .....8.325
Carnegie,Pa. C12 .....8.325
Chicago W18 .....8.325
Cleveland A7, C20 ....8.325
Detroit B5, P17 .....8.525
Detroit R7 .....8.325
Donora,Pa. A7 .....8.325
Elyria,O. W8 .....8.325
FranklinPark,Ill. N5 ..8.325
Gary,Ind. R2 .....8.325
GreenBay,Wis. F7 .....8.325
Hammond,Ind. L2, M13 8.325
Hartford,Conn. R2 .....8.625
Harvey,Ill. R5 .....8.325
Lackawanna,N.Y. B2 ..8.325
LosAngeles P2, S30 ..10.10
Mansfield,Mass. B5 ..8.625
Massillon,O. R2, R8 ..8.325
Midland,Pa. C18 .....8.325
Monaca,Pa. S17 .....8.325
Newark,N.J. W18 .....8.50
Plymouth,Mich. P5 ....8.525
S.Chicago W14 .....8.325
SpringCity,Pa. K3 ....8.50
Struthers,O. Y1 .....8.325
Warren,O. C17 .....8.325
Waukegan,Ill. A7 .....8.325
Worcester,Mass. A7 ..8.625
Youngstown F3, Y1 ..8.325

BARS, Reinforcing (To Fabricators)

Ala.City,Ala. R2 .....5.075
Atlanta A11 .....5.575
Birmingham C15 .....5.375
Bridgeport,Conn. N19 ..5.30
Buffalo R2 .....5.075
Cleveland R2 .....5.075
Ecorse,Mich. G5 .....5.425
Emeryville,Calif. J7 ...5.85
Fairfield,Ala. T2 .....5.075
Fairless,Pa. U5 .....5.225

Ft.Worth,Tex.(42) T4 .5.525
Gary,Ind. U5 .....5.075
Houston S5 .....5.325
Ind.Harbor,Ind. I-2, Y1 5.075
Johnstown,Pa. B2 ....5.075
Joliet,Ill. P22 .....5.575
KansasCity,Mo. S5 ....5.325
Lackawanna,N.Y. B2 ..5.075
LosAngeles B3 .....5.775
Milton,Pa. M18 .....5.225
Minnequa,Colo. C10 ...5.525
Niles,Calif. P1 .....5.85
Pittsburg,Calif. C11 ..5.775
Pittsburgh J5 .....5.075
Portland,Oreg. O4 .....5.85
SandSprings,Okla. S5 ..5.575
Seattle B3, N14 .....5.825
S.Chicago,Ill. R2 .....5.075
S.Duquesne,Pa. U5 ....5.075
S.SanFrancisco B3 ....5.825
SparrowsPoint,Md. B2..5.075
Sterling,Ill.(1) N15 ...5.075
Sterling,Ill. N15 .....5.175
Struthers,O. Y1 .....5.075
Torrance,Calif. C11 ...5.775
Youngstown R2, U5 ...5.075

BARS, Reinforcing (Fabricated; to Consumers)

Chicago U8 .....6.81
Cleveland U8 .....6.79
Johnstown,Pa. ¼-1" B2.6.73
KansasCity,Mo. S5 .....7.00
Marion,O. P11 .....6.70
NewYork U8 .....7.18
Pittsburgh U8 .....6.75
Seattle B3, N14 .....7.20
SparrowsPt. ¼-1" B2 ..6.73
Williamsport,Pa. S19 ...6.65

RAIL STEEL BARS

ChicagoHts.(3) C2, I-2.5.075
ChicagoHts.(4) I-2 ....5.075
ChicagoHts.(4) C2 .....5.65
Ft.Worth,Tex.(26) T4..5.525
Franklin,Pa.(4) F5 ....5.60
Franklin,Pa.(3) F5 ....5.10
JerseyShore,Pa.(4) J8 ..5.00
Marion,O.(3) P11 .....5.15
Moline,Ill.(3) R2 .....5.225
Tonawanda(3) B12 .....5.65
Tonawanda(4) B12 .....6.15
Williamsport,Pa.(3) S19.5.65

BARS, Wrought Iron

Economy,Pa.(S.R.)B14 12.305
Economy,Pa.(D.R.)B14 15.301
Economy(Staybolt)B14 15.676
McK.Rks.(S.R.) L5 ...13.15
McK.Rks.(D.R.) L5 ...18.00
McK.Rks.(Staybolt) L5.19.15

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

Ala.City,Ala. R2 .....4.675
Allenport,Pa. P7 .....4.675
Ashland,Ky.(8) A10 ..4.675
Cleveland J5, R2 .....4.675
Conshohocken,Pa. A3 ..4.725
Detroit(8) M1 .....4.775
Dravosburg,Pa. U5 ....4.675
Ecorse,Mich. G5 .....4.775
Fairfield,Ala. T2 .....4.675
Fairless,Pa. U5 .....4.725
Fontana,Calif. K1 .....5.525
Gary,Ind. U5 .....4.675
Geneva,Utah C11 .....4.775
GraniteCity,Ill.(8) G4 ..4.875
Ind.Harbor,Ind. I-2, Y1 4.675
Lackawanna,N.Y. B2 ..4.675
Munhall,Pa. U5 .....4.675
Newport,Ky.(8) A2 ....4.675
Niles,O. M21 .....4.675
Pittsburg,Calif. C11 ...5.375
Pittsburgh J5 .....4.675
Portsmouth,O. P12 ....4.675
Riverdale,Ill. A1 .....4.675
Sharon,Pa. S3 .....4.675
S.Chicago,Ill. W14 ....4.675
SparrowsPoint,Md. B2..4.675
Steubenville,O. W10 ...4.675
Warren,O. R2 .....4.675
Weirton,W.Va. W6 ....4.675
Youngstown U5, Y1 ...4.675

SHEETS, H.R. (19 Ga. & Lighter)

Niles,O. M21 .....5.75

SHEETS, H.R. Alloy

Dravosburg,Pa. U5 ....7.75
Gary,Ind. U5 .....7.75
Ind.Harbor,Ind. Y1 ....7.75
Newport,Ky. A2 .....7.75
Youngstown Y1, U5 ....7.75

SHEETS, H.R. (14 Ga. & Heavier) High-Strength Low-Alloy

Cleveland J5, R2 .....6.90
Conshohocken,Pa. A3 ...6.95
Dravosburg,Pa. U5 ....6.90
Ecorse,Mich. G5 .....7.00
Fairfield,Ala. T2 .....6.90
Fairless,Pa. U5 .....6.95
Fontana,Calif. K1 .....7.75
Gary,Ind. U5 .....6.90
Ind.Harbor,Ind. I-2, Y1 6.90
Lackawanna(35) B2 ....6.90
Munhall,Pa. U5 .....6.90
Pittsburgh J5 .....6.90
S.Chicago,Ill. U5 .....6.90
SparrowsPoint(36) B2 ..6.90
Warren,O. R2 .....6.90
Weirton,W.Va. W6 ....6.90
Youngstown U5, Y1 ....6.90

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky.(8) A10 ...4.925
Cleveland R2 .....5.425
Ind.Harbor,Ind. I-2 ...4.925
Warren,O. R2 .....5.425

SHEETS, Cold-Rolled Steel (Commercial Quality)

Allenport,Pa. P7 .....5.75
Cleveland J5, R2 .....5.75
Conshohocken,Pa. A3 ...5.80
Detroit M1 .....5.75
Dravosburg,Pa. U5 .....5.75
Ecorse,Mich. G5 .....5.85
Fairfield,Ala. T2 .....5.75
Fairless,Pa. U5 .....5.80
Follansbee,W.Va. F4 ...5.75
Fontana,Calif K1 .....7.00
Gary,Ind. U5 .....5.75
GraniteCity,Ill. G4 .....5.95
Ind.Harbor,Ind. I-2, Y1 5.75
Lackawanna,N.Y. B2 ..5.75
Mansfield,O. E6 .....5.75
Middletown,O. A10 .....5.75
Newport,Ky. A2 .....5.75
Pittsburg,Calif. C11 ....6.70
Pittsburgh J5 .....5.75
Portsmouth,O. P12 .....5.75
SparrowsPoint,Md. B2..5.75
Steubenville,O. W10 ....5.75
Warren,O. R2 .....5.75
Weirton,W.Va. W6 ....5.75
Yorkville,O. W10 .....5.75
Youngstown Y1 .....5.75

SHEETS, Cold-Rolled High-Strength, Low-Alloy

Cleveland J5, R2 .....8.525
Dravosburg,Pa. U5 ....8.525
Ecorse,Mich. G5 .....8.625
Fairless,Pa. U5 .....8.575
Fontana,Calif. K1 .....9.775
Gary,Ind. U5 .....8.525
IndianaHarbor,Ind. Y1.8.525
Lackawanna(37) B2 ...8.525
Pittsburgh J5 .....8.525
SparrowsPoint(38) B2 .8.525
Warren,O. R2 .....8.525
Weirton,W.Va. W6 ....8.525
Youngstown Y1 .....8.525

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 .....6.50
Middletown,O. A10 ....6.25
Warren,O. R2 .....6.50

SHEETS, Culvert

	Cu Steel	Cu Fe
Ashland,Ky. A10	6.65	6.90
Canton,O. R2	6.65	7.15
Dravosburg U5	6.65	6.90
Fairfield T2	6.65	6.90
Gary,Ind. U5	6.65	6.90
GraniteCity,Ill. G4	6.85	...
Ind.Harbor I-2	6.65	6.90
Kokomo,Ind. C16	6.75	...
MartinsFry. W10	6.65	...
Pittsburgh J5	6.65	...
Pitts.,Calif. C11	7.40	...
SparrowsPt. B2	6.65	...

SHEETS, Culvert—Pure Iron

Ind.Harbor,Ind. I-2 ....6.90
MartinsFry.,O. W10 ....6.90

SHEETS, Galvanized Steel Hot-Dipped

Ala.City,Ala. R2 .....6.30‡
Ashland,Ky. A10 .....6.30†
Canton,O. R2 .....6.30‡
Dover,O. R1 .....6.30†
Dravosburg,Pa. U5 ....6.30†
Fairfield,Ala. T2 .....6.30†
Gary,Ind. U5 .....6.30†
GraniteCity,Ill. G4 ....6.50*
Ind.Harbor,Ind. I-2 ...6.30†
Kokomo,Ind. C16 .....6.40‡
MartinsFerry,O. W10 ..6.30*
Middletown,O. A10 ...6.30†
Pittsburg,Calif. C11 ...7.05*
Pittsburgh J5 .....6.30†
SparrowsPt.,Md. B2 ..6.30†
Warren,O. R2 .....6.30†
Weirton,W.Va. W6 ....6.30*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous.

SHEETS, Well Casing

Fontana,Calif. K1 .....7.025

SHEETS, Galvanized High-Strength Low-Alloy

Dravosburg,Pa. U5 ...9.275
SparrowsPoint(39) B2..9.275

SHEETS, Galvannealed Steel

Canton,O. R2 .....6.70
Dravosburg,Pa. U5 ....6.70
Kokomo,Ind. C16 .....7.00

SHEETS, Galvanized Ingot Iron (Hot-dipped Continuous)

Ashland,Ky. A10 .....6.55
Middletown,O. A10 .....6.55

SHEETS, Electrogalvanized

Cleveland(28) R2 .....7.125
Niles,O.(28) R2 .....7.125
Weirton,W.Va. W6 ....6.975

SHEETS, Aluminum Coated

Butler,Pa. A10 (type 1) 8.95
Butler,Pa. A10 (type 2) 9.05

SHEETS, Enameling Iron

Ashland,Ky. A10 .....6.325
Cleveland R2 .....6.325
Dravosburg,Pa. U5 ....6.325
Gary,Ind. U5 .....6.325
GraniteCity,Ill. G4 ....6.525
Ind.Harbor,Ind. I-2, Y1 6.325
Middletown,O. A10 ....6.325
Niles,O. M21 .....6.325
Youngstown Y1 .....6.325

BLUED STOCK, 29 Gage

Follansbee,W.Va. F4 ...8.35
Ind.Harbor,Ind. I-2 ....8.175
Yorkville,O. W10 .....8.175

SHEETS, Long Terne Steel (Commercial Quality)

BeechBottom,W.Va. W10 6.70
Gary,Ind. U5 .....6.70
Mansfield,O. E6 .....6.70
Middletown,O. A10 .....6.70
Niles,O. M21 .....6.70
Weirton,W.Va. W6 .....6.70

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 .....7.10

Key To Producers

A1 Acme Steel Co.
A2 Acme-Newport Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U.S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.

B1 Babcock & Wilcox Co.
B2 Bethlehem Steel Co.
B3 Beth. Pac. Coast Steel
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div. Colo. Fuel & Iron
B11 Buffalo Bolt Co., Div., Buffalo-Eclipse Corp.
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div. Borg-Warner Corp.
C4 Carpenter Steel Co.
C7 Cleve. Cold Rolling Mills
C8 Cold Metal Products Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div. H. K. Porter Co. Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C22 Claymont Steel Products Dept. Wickwire Spencer Steel Division
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.

D2 Detroit Steel Corp.
D3 Dearborn Division Sharon Steel Corp.
D4 Disston & Sons, Henry
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E1 EasternGas&FuelAssoc.
E2 Eastern Stainless Steel
E4 Electro Metallurgical Co.
E5 Elliott Bros. Steel Co.
E6 Empire Steel Corp.

F2 Firth Sterling Inc.
F3 Fitzsimmons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div. Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.

H1 Hanna Furnace Corp.
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins, E., Steel Tube
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L5 Lockhart Iron & Steel
L6 Lone Star Steel Co.
L7 Lukens Steel Co.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M13 Monarch Steel Div., Jones & Laughlin Steel Corp.
M14 McInnes Steel Co.
M16 Md. Fine & Special. Wire
M17 Metal Forming Corp.
M18 Milton Steel Division, Merritt-Chapman & Scott
M21 Mallory-Sharon Titanium Corp.

N1 National Standard Co.
N2 National Supply Co.
N3 National Tube Div., U.S. Steel Corp.
N5 Nelson Steel & Wire Co.
N6 New England High Carbon Wire Co.
N8 Newman-Crosby Steel
N9 Newport Steel Corp.
N14 Northwest.SteelRoll.Mill
N15 Northwestern S.&W. Co.
N16 New Delphos Mfg. Co.
N19 Northeastern Steel Corp.
O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Iron & Steel Co. Sub. of Barium Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke & Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Division, Detroit Steel Corp.
P13 Precision Drawn Steel
P14 Pitts. Screw & Bolt Co.
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., Amer. Chain & Cable
P17 Plymouth Steel Co.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.

R1 Reeves Steel & Mfg. Co.
R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R7 Rotary Electric Steel Co.
R8 Reliance Div., EatonMfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Steel Div. Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Corp.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Corp.
S40 Seneca Steel Service

T2 Tenn.Coal & Iron Div., U.S. Steel Corp.
T3 Tenn. Prod. & Chem.
T4 Texas Steel Co.
T5 Thomas Strip Division, Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div., Am. Rad. & Stan. San.
T13 Tube Methods Inc.
T19 Techalloy Co. Inc.

U4 Universal-Cyclops Steel
U5 United States Steel Corp.
U6 U.S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U.S. Steel Supply Div., U.S. Steel Corp.

V2 Vanadium-Alloys Steel
V3 Vulcan Crucible Div., H. K. Porter Co. Inc.

W1 Wallace Barnes Co.
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W7 W.Va. Steel & Mfg. Co.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.

Y1 Youngstown Sheet & Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala. City, Ala. (27) R2	4.675
Allenport, Pa. P7	4.675
Alton, Ill. L1	4.875
Ashland, Ky. (8) A10	4.675
Atlanta A11	4.875
Bessemer, Ala. T2	4.675
Birmingham C15	4.975
Bridgeport, Conn. N19	4.625
Buffalo (27) R2	4.675
Conshohocken, Pa. A3	4.725
Detroit M1	4.775
Ecorse, Mich. G5	4.775
Fairfield, Ala. T2	4.675
Fontana, Calif. K1	5.525
Gary, Ind. U5	4.675
Houston S5	4.925
Ind. Harbor, Ind. I-2, Y1	4.675
Johnstown, Pa. (25) B2	4.675
Kansas City, Mo. S5	4.925
Lackaw'na, N.Y. (25) B2	4.675
Los Angeles (25) B3	5.425
Minnequa, Colo. C10	5.775
Pittsburg, Calif. C11	5.425
Riverdale, Ill. A1	4.675
San Francisco S7	5.95
Seattle (25) B3	5.675
Seattle N14	5.675
Sharon, Pa. S3	4.675
S. Chicago, Ill. W14	4.675
S. San Francisco (25) B3	5.425
Sparrows Point, Md. B2	4.675
Sterling, Ill. (1) N15	4.675
Sterling, Ill. N15	4.775
Torrance, Calif. C11	5.425
Warren, O. R2	4.675
Weirton, W.Va. W6	4.675
Youngstown U5	4.675

STRIP, Hot-Rolled Alloy

Bridgeport, Conn. N19	7.50
Carnegie, Pa. S18	7.75
Dravosburg, Pa. U5	7.75
Gary, Ind. U5	7.75
Ind. Harbor, Ind. Y1	7.75
Los Angeles B3	8.95
Newport, Ky. A2	7.75
Sharon, Pa. S3	7.75
S. Chicago, Ill. W14	7.75
Youngstown U5, Y1	7.75

STRIP, Hot-Rolled High-Strength, Low-Alloy

Bessemer, Ala. T2	6.95
Conshohocken, Pa. A3	6.95
Ecorse, Mich. G5	7.05
Fairfield, Ala. T2	6.95
Gary, Ind. U5	6.95
Houston S5	7.20
Ind. Harbor, Ind. I-2, Y1	6.95
Kansas City, Mo. S5	7.20
Lackawanna, N.Y. B2	6.95
Los Angeles (25) B3	7.70
Seattle (25) B3	7.95
Sharon, Pa. S3	6.95
S. San Francisco (25) B3	7.70
Sparrows Point, Md. B2	6.95
Warren, O. R2	6.95
Weirton, W.Va. W6	6.95
Youngstown U5, Y1	6.95

STRIP, Hot-Rolled Ingot Iron

Ashland, Ky. (8) A10	4.925
Warren, O. R2	5.425

STRIP, Cold-Rolled Carbon

Anderson, Ind. G6	6.85
Baltimore T6	6.85
Boston T6	7.40
Buffalo S40	6.85
Cleveland A7, J5	6.85
Conshohocken, Pa. A3	6.90
Dearborn, Mich. D3	6.95
Detroit D2, M1, P20	6.95
Dover, O. G6	6.85
Ecorse, Mich. G5	6.95
Follansbee, W.Va. F4	6.85
Fontana, Calif. K1	8.70
Franklin Park, Ill. T6	6.95
Ind. Harbor, Ind. Y1	6.85
Indianapolis C8	7.00
Los Angeles C1	8.80
New Bedford, Mass. R10	7.30
New Britain (10) S15	6.85
New Castle, Pa. B4, E5	6.85
New Haven, Conn. D2	7.30
New Kensington, Pa. A6	6.85
Pawtucket, R.I. R3	7.50
Pawtucket, R.I. N8	7.40
Pittsburgh J5	6.85
Riverdale, Ill. A1	6.95
Rome, N.Y. (32) R6	6.85
Sharon, Pa. S3	6.85
Trenton, N.J. (31) R5	8.30
Wallingford, Conn. W2	7.30
Warren, O. R2, T5	6.85
Weirton, W.Va. W6	6.85
Worcester, Mass. A7	7.40
Youngstown C8, Y1	6.85

STRIP, Cold-Rolled Alloy

Boston T6	14.90
Carnegie, Pa. S18	14.55
Cleveland A7	14.55
Dover, O. G6	14.55
Franklin Park, Ill. T6	14.55
Harrison, N.J. C18	14.55
Indianapolis C8	14.70
Pawtucket, R.I. N8	14.90
Sharon, Pa. S3	14.55
Worcester, Mass. A7	14.85
Youngstown C8	14.55

STRIP, Cold-Rolled High-Strength, Low-Alloy

Cleveland A7	10.00
Dearborn, Mich. D3	10.10
Dover, O. G6	10.10
Ecorse, Mich. G5	10.10
Ind. Harbor, Ind. Y1	10.20
Sharon, Pa. S3	10.00
Warren, O. R2	10.00
Weirton, W.Va. W6	10.20
Youngstown Y1	10.20

STRIP, Cold-Finished Spring Steel (Annealed)

	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Baltimore T6	8.50	10.10	12.30	15.30	18.25
Boston T6	8.50	10.10	12.30	15.30	18.25
Bristol, Conn. W1	...	...	12.30	15.30	18.25
Carnegie, Pa. S18	...	9.80	12.00	15.00	....
Cleveland A7	7.95	9.80	12.00	15.00	17.95
Cleveland C7	...	9.80	12.00	15.00	17.95
Dover, O. G6	7.95	9.80	12.00	15.00	17.95
Detroit D2	8.05	9.90	12.10	15.10	....
Dearborn, Mich. D3	8.05	9.30	12.10	....	....
Franklin Park, Ill. T6	8.05	9.80	12.00	15.00	17.90
Harrison, N.J. C18	...	...	12.30	15.30	18.25
Indianapolis C8	8.10	9.95	12.00	15.00	17.95
New Britain, Conn. (10) S15	7.95	9.80	12.00	15.00	17.95
New Castle, Pa. B4, E5	7.95	9.80	12.00	15.00	....
New Haven, Conn. D2	8.40	10.10	12.30	15.30	....
New Kensington, Pa. A6	7.95	9.80	12.00	15.00	....
New York W3	...	10.10	12.30	15.30	18.25
Pawtucket, R.I. N8	8.50	10.10	12.30	15.30	18.25
Riverdale, Ill. A1	8.05	9.80	12.00	15.00	17.95
Rome, N.Y. (32) R6	7.95	9.80	12.00	15.00	17.95
Sharon, Pa. S3	7.95	9.80	12.00	15.00	17.95
Trenton, N.J. R5	...	10.10	12.30	15.30	18.25
Wallingford, Conn. W2	8.40	10.10	12.30	15.30	18.15
Warren, O. T5	7.95	9.80	12.00	15.00	17.95
Weirton, W.Va. W6	7.95	9.80	12.00	15.00	17.95
Worcester, Mass. A7, T6	8.50	10.10	12.30	15.30	18.25
Youngstown C8	7.95	9.80	12.00	15.00	17.95

Spring Steel (Tempered)			Up to 0.80C	0.81-1.05C	1.06-1.35C
Bristol, Conn. W1	...	...	16.80	20.65	....
Buffalo W12	...	...	16.80	....	....
Franklin Park, Ill. T6	...	...	17.15	21.00	25.35
Harrison, N.J. C18	...	...	16.80	20.65	25.00
New York W3	...	...	16.80	20.65	25.00
Palmer, Mass. W12	...	...	16.80	....	....
Trenton, N.J. R5	...	...	16.80	20.65	25.00
Worcester, Mass. A7, T6	...	...	16.80	20.65	25.00
Youngstown C8	...	...	17.15	21.00	25.35

STRIP, Galvanized (Continuous)

Sharon, Pa. S3	6.975

TIGHT COOPERAGE HOOP

Atlanta A11	5.40
Riverdale, Ill. A1	5.25
Sharon, Pa. S3	5.10
Youngstown U5	5.10

STRIP, Cold-Rolled Ingot Iron

Warren, O. R2	7.60

STRIP, C.R. Electrogalvanized

Cleveland A7	6.85*
Dover, O. G6	6.85*
Riverdale, Ill. A1	6.95*
Warren, O. B9, T5	6.85*
Worcester, Mass. A7	7.40*
Youngstown C8	6.85*

*Plus galvanizing extras.

SILICON STEEL

H.R. SHEETS (22 Ga., cut lengths)	Field	Armature	Electric	Motor	Dynamo
Beech Bottom, W.Va. W10	...	...	11.00	12.05	13.05
Brackenridge, Pa. A4	...	...	11.00	12.50	13.05
Mansfield, O. E6	9.20	10.35	11.00	12.05	13.05
Newport, Ky. A2	9.20	10.35	11.00	12.05	13.05
Niles, O. M21	9.20	10.35	11.00	12.05	....
Vandergrift, Pa. U5	...	10.35	11.00	12.05	13.05
Warren, O. R2	9.20	10.35	11.00	12.05	....
Zanesville, O. A10	...	10.35	11.00	12.05	13.05
Zanesville, O. A10 (FP coils)	...	10.55	11.525	12.575	13.55
Zanesville, O. A10 (SP coils)	...	....	11.025	12.075	13.05

C.R. COILS & CUT LENGTHS (22 Ga.)

Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
Brackenridge, Pa. A4	....	....	11.525	12.575	13.55
Granite City, Ill. G4	9.40*	10.55*	11.225*	12.275*	....
Indiana Harbor, Ind. I-2	9.20†	10.35*	11.025*	12.075*	....
Mansfield, O. E6	9.70	10.85	11.525	12.575	13.55
Vandergrift, Pa. U5	9.20*	10.35*	11.025*	12.075*	13.05*
Vandergrift, Pa. U5	...	10.85†	11.525†	12.575†	13.55†
Warren, O. R2	9.20*	10.85	11.525	12.575	13.55

	Transformer Grades			
H.R. SHEETS (22 Ga., cut lengths)	T-72	T-65	T-58	T-52
Beech Bottom, W.Va. W10	14.05	14.60	15.10	16.15
Brackenridge, Pa. A4	14.05	....	....	....
Vandergrift, Pa. U5	14.05	14.60	15.10	16.15
Zanesville, O. A10	14.05	14.60	15.10	16.15

	Grain Oriented					
C.R. COILS & CUT LENGTHS (22 Ga.)	T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge, Pa. A4	16.90	18.50	19.00	19.50	14.05**	
Butler, Pa. A10	....	....	18.50	19.00	19.50	....
Vandergrift, Pa. U5	15.90	16.90	18.50	19.00	19.50	14.55**
Warren, O. R2	....	....	....	....	....	14.55‡

*Semiprocessed. †Fully processed only. ‡Coils, annealed, semiprocessed ½c lower. **Cut lengths, ¾-cent lower.

TIN MILL PRODUCTS

TIN PLATE, Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa, Pa. J5	$8.40	$8.65	$9.05
Dravosburg, Pa. U5	8.40	8.65	9.05
Fairfield, Ala. T2	8.50	8.75	9.15
Fairless, Pa. U5	8.50	8.75	9.15
Fontana, Calif. K1	9.15	9.40	9.80
Gary, Ind. U5	8.40	8.65	9.05
Granite City, Ill. G4	8.50	8.75	9.15
Indiana Harbor, Ind. I-2, Y1	8.40	8.65	9.05
Niles, O. R2	8.40	8.65	9.05
Pittsburg, Calif. C11	9.15	9.40	9.80
Sparrows Point, Md. B2	8.50	8.75	9.15
Weirton, W.Va. W6	8.40	8.65	9.05
Yorkville, O. W10	8.40	8.65	9.05

ELECTROTIN (22-27 Gage; Dollars per 100 lb)			
Aliquippa, Pa. J5	7.425	7.625	....
Niles, O. R2	7.425	7.625	7.925

TINPLATE, American	1.25 lb	1.50 lb
Aliquippa, Pa. J5	$9.70	$9.95
Dravosburg, Pa. U5	9.70	9.95
Fairfield, Ala. T2	9.80	10.05
Fairless, Pa. U5	9.80	10.05
Fontana, Calif. K1	10.45	10.70
Gary, Ind. U5	9.70	9.95
Pitts., Calif. C11	10.45	10.70
Sp. Pt., Md. B2	9.80	10.05
Weirton, W.Va. W6	9.70	9.95
Yorkville, O. W10	9.70	9.95

BLACK PLATE (Base Box)

Aliquippa, Pa. J5	$7.50
Dravosburg, Pa. U5	7.50
Fairfield, Ala. T2	7.60
Fairless, Pa. U5	7.60
Fontana, Calif. K1	8.25
Gary, Ind. U5	7.50
Granite City, Ill. G4	7.60
Ind. Harbor, Ind. I-2, Y1	7.50
Niles, O. R2	7.80
Pittsburg, Calif. C11	8.25
Sparrows Point, Md. B2	7.60
Weirton, W.Va. W6	7.50
Yorkville, O. W10	7.50

HOLLOWARE ENAMELING Black Plate (29 Gage)

Aliquippa, Pa. J5	$7.15
Dravosburg, Pa. U5	7.15
Gary, Ind. U5	7.15
Granite City, Ill. G4	7.25
Ind. Harbor, Ind. Y1	7.15
Yorkville, O. W10	7.15

MANUFACTURING TERNES (Special Coated; Base Box)

Dravosburg, Pa. U5	$9.20
Gary, Ind. U5	9.20

ROOFING SHORT TERNES (8 lb Coated; Base Box)

Gary, Ind. U5	$10.75

WIRE

WIRE, Manufacturers Bright, Low Carbon

Alabama City, Ala. R2	7.20
Aliquippa, Pa. J5	7.20
Alton, Ill. L1	7.40
Atlanta A11	7.40
Bartonville, Ill. K4	7.30
Buffalo W12	7.20
Chicago W13	7.20
Cleveland A7, C20	7.20
Crawfordsville, Ind. M8	7.30
Donora, Pa. A7	7.20
Duluth A7	7.20
Fairfield, Ala. T2	7.20
Fostoria, O. (24) S1	7.30
Houston S5	7.45
Jacksonville, Fla. M8	7.55
Johnstown, Pa. B2	7.20
Joliet, Ill. A7	7.20
Kansas City, Mo. S5	7.45
Kokomo, Ind. C16	7.30
Los Angeles B3	8.15
Minnequa, Colo. C10	7.45
Monessen, Pa. P7, P16	7.20
N. Tonawanda, N.Y. B11	7.20
Palmer, Mass. W12	7.50
Pittsburg, Calif. C11	8.15
Portsmouth, O. P12	7.20
Rankin, Pa. A7	7.20
S. Chicago, Ill. R2	7.20
S. San Francisco C10	8.15
Sparrows Point, Md. B2	7.30
Sterling, Ill. (1) N15	7.20
Sterling, Ill. N15	7.30
Struthers, O. Y1	7.20
Waukegan, Ill. A7	7.20
Worcester, Mass. A7	7.50

WIRE, Gal'd ACSR for Cores

Bartonville, Ill. K4	11.75
Buffalo W12	11.75
Johnstown, Pa. B2	11.75
Minnequa, Colo. C10	11.875
Monessen, Pa. P16	11.75
Muncie, Ind. I-7	11.95
Palmer, Mass. W12	12.05
Pittsburg, Calif. C11	12.55
Portsmouth, O. P12	11.75
Roebling, N.J. R5	12.05
Sparrows Pt., Md. B2	11.85
Struthers, O. Y1	11.75

ROPE WIRE (A)

Bartonville, Ill. K4	11.55
Buffalo W12	11.55
Fostoria, O. S1	11.55
Johnstown, Pa. B2	11.55
Monessen, Pa. P7, P16	11.55
Muncie, Ind. I-7	11.75
Palmer, Mass. W12	11.85
Portsmouth, O. P12	11.55
Roebling, N.J. R5	11.85
Sparrows Pt., Md. B2	11.65
Struthers, O. Y1	11.55
Worcester, Mass. J4	11.85

(A) Plow and Mild Plow; add 0.25c for Improved Plow

WIRE, Upholstery Spring

Aliquippa, Pa. J5	8.40
Alton, Ill. L1	8.60
Buffalo W12	8.40
Cleveland A7	8.40
Donora, Pa. A7	8.40
Duluth A7	8.40
Johnstown, Pa. B2	8.40
Kansas City, Mo. S5	8.65
Los Angeles B3	9.35
Minnequa, Colo. C10	8.60
Monessen, Pa. P7, P16	8.40
New Haven, Conn. A7	8.70
Palmer, Mass. W12	8.70
Pittsburg, Calif. C11	9.35
Portsmouth, O. P12	8.40
Roebling, N.J. R5	8.70
S. Chicago, Ill. R2	8.40
S. San Francisco C10	9.35
Sparrows Point, Md. B2	8.50
Struthers, O. Y1	8.40
Trenton, N.J. A7	8.70
Waukegan, Ill. A7	8.40
Worcester, Mass. A7	8.70

WIRE, MB Spring, High Carbon

Aliquippa, Pa. J5	8.725
Alton, Ill. L1	8.925
Bartonville, Ill. K4	8.825
Buffalo W12	8.725
Cleveland A7	8.725
Donora, Pa. A7	8.725
Duluth A7	8.725
Fostoria, O. S1	8.775
Johnstown, Pa. B2	8.725
Los Angeles B3	9.675
Milbury, Mass. (12) N6	9.025
Minnequa, Colo. C10	8.975
Monessen, Pa. P7, P16	8.725
Muncie, Ind. I-7	8.925
Palmer, Mass. W12	9.025
Pittsburg, Calif. C11	9.675
Portsmouth, O. P12	8.725
Roebling, N.J. R5	9.025
S. Chicago, Ill. R2	8.725
S. San Francisco C10	9.675
Sparrows Pt., Md. B2	8.825
Struthers, O. Y1	8.725
Trenton, N.J. A7	9.025
Waukegan, Ill. A7	8.725
Worcester A7, J4, T6	9.025

WIRE, Fine & Weaving (8" Coils)

Alton, Ill. L1	14.35
Bartonville, Ill. K4	14.25
Buffalo W12	14.15
Chicago W13	13.55
Cleveland A7	14.15
Crawfordsville, Ind. M8	14.25
Fostoria, O. S1	14.15
Jacksonville, Fla. M8	14.50
Johnstown, Pa. B2	14.15
Kokomo, Ind. C16	14.15
Minnequa, Colo. C10	13.90
Monessen, Pa. P6	14.15
Muncie, Ind. I-7	14.35
Palmer, Mass. W12	14.45
Roebling, N.J. C10	14.45
S. San Francisco C10	14.50
Waukegan, Ill. A7	14.15
Worcester, Mass. A7, T6	14.45

WIRE

WIRE, Tire Bead

Bartonville,Ill. K4	15.25
Monessen,Pa. P16	15.45
Roebling,N.J. R5	15.60

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	10.75
Baltimore T6	11.05
Boston T6	11.05
Buffalo W12	10.75
Cleveland A7	10.75
Crawfordsville,Ind. M8	10.75
Dover,O. G6	10.75
Fostoria,O. S1	10.75
Franklin Park,Ill. T6	10.85
Kokomo,Ind. C16	10.75
Massillon,O. R8	10.75
Milwaukee C23	10.95
Monessen,Pa. P7, P16	10.75
New Kensington,Pa. A6	10.75
Palmer,Mass. W12	11.05
Pawtucket,R.I. N8	11.05
Riverdale,Ill. A1	10.85
Rome,N.Y. R6	10.75
Trenton,N.J. R5	11.05
Worcester,Mass. A7, T6	11.05

NAILS & POLISHED STAPLES,

Stock	Col.
Alabama City,Ala. R2	.164
Aliquippa,Pa. J5	.164
Atlanta A11	.166
Bartonville,Ill. (7) K4	.169
Crawfordsville,Ind. M8	.166
Donora,Pa. A7	.164
Duluth A7	.164
Fairfield,Ala. T2	.164
Houston,Tex. S5	.169
Jack'ville,Fla. (20) M8	.175
Johnstown,Pa. B2	.164
Joliet,Ill. A7	.164
Kansas City,Mo. S5	.169
Kokomo,Ind. C16	.166
Minnequa,Colo. C10	.169
Monessen,Pa. (7) P7	.167
Pittsburg,Calif. C11	.183
Rankin,Pa. A7	.164
S Chicago,Ill. R2	.164
Sparrows Pt.,Md. B2	.166
Sterling,Ill. (1) N15	.164
Worcester,Mass. A7	.170

NAILS, Stock	Col.
Chicago (7) W13	.167
Cleveland (7) A9	.173

(To Wholesalers; per cwt)

Galveston,Tex. D7	$8.75

NAILS, Cut (100 lb keg) To Dealers (33)

Conshohocken,Pa. A3	$9.80
Wheeling,W.Va. W10	9.80

TIE WIRE, Automatic Baler (14½ Ga.)(Per 97 lb Net Box)

Coil No. 3150	
Alabama City,Ala. R2	$9.53
Atlanta A11	9.63
Bartonville,Ill. K4	10.13
Buffalo W12	10.05
Crawfordsville,Ind. M8	9.63
Donora,Pa. A7	9.53
Duluth A7	9.53
Houston S5	9.78
Jack'ville,Fla. M8	10.09
Johnstown,Pa. B2	9.53
Joliet,Ill. A7	9.53
Kansas City,Mo. S5	9.78
Kokomo,Ind. C16	9.63
Los Angeles B3	10.32
Minnequa,Colo. C10	9.78
Pittsburg,Calif. C11	10.31
S Chicago,Ill. R2	9.53
S San Francisco C10	10.31
Sparrows Pt.,Md. B2	9.63
Sterling,Ill. (1) N15	9.53

Coil No. 6500 Stand.	
Alabama City,Ala. R2	$9.85
Atlanta A11	9.95
Bartonville,Ill. K4	10.45
Buffalo W12	10.35
Crawfordsville,Ind. M8	9.95
Donora,Pa. A7	9.85
Duluth A7	9.85
Houston S5	10.10
Kokomo,Ind. C16	9.95
Jacksonville,Fla. M8	10.41
Johnstown,Pa. B2	9.85
Joliet,Ill. A7	9.85
Kansas City,Mo. S5	10.10
Kokomo,Ind. C16	10.45
Los Angeles B3	10.65
Minnequa,Colo. C10	10.10
Pittsburg,Calif. C11	10.65
S Chicago,Ill. R2	9.85
S San Francisco C10	10.65
Sparrows Pt.,Md. B2	9.95
Sterling,Ill. (1) N15	9.85

Coil Interim	
Alabama City,Ala. R2	$9.90
Atlanta A11	10.00
Bartonville,Ill. K4	10.50
Buffalo W12	10.40
Crawfordsville,Ind. M8	10.00
Donora,Pa. A7	9.90
Duluth A7	9.90
Houston S5	10.15
Jacksonville,Fla. M8	10.46
Johnstown,Pa. B2	9.90
Joliet,Ill. A7	9.90
Kansas City,Mo. S5	10.15
Kokomo,Ind. C16	10.00
Los Angeles B3	10.70
Minnequa,Colo. C10	10.15
Pittsburg,Calif. C11	10.70
S Chicago,Ill. R2	9.90
S San Francisco C10	10.70
Sparrows Pt.,Md. B2	10.00
Sterling,Ill. (1) N15	9.90

WIRE, Barbed	Col.
Alabama City,Ala. R2	.184**
Aliquippa,Pa. J5	.181§
Atlanta A11	.190*
Bartonville,Ill. K4	.193
Crawfordsville,Ind. M8	.190
Donora,Pa. A7	.184†
Duluth A7	.184†
Fairfield,Ala. T2	.184†
Houston,Tex. S5	.189**
Jacksonville,Fla. M8	.195
Johnstown,Pa. B2	.188*
Joliet,Ill. A7	.184†
Kansas City,Mo. S5	.189**
Kokomo,Ind. C16	.186†
Minnequa,Colo. C10	.189**
Monessen,Pa. P7	.191*
Pittsburg,Calif. C11	.204†
Rankin,Pa. A7	.184†
S Chicago,Ill. R2	.184**
S San Francisco C10	.207**
Sparrows Point,Md. B2	190*
Sterling,Ill. (1) N15	.188*

WOVEN FENCE, 9-15 Ga.	Col.
Ala. City,Ala. R2	176**
Aliq'ppa,Pa. 9-14½ga. J5	179§
Atlanta A11	182*
Bartonville,Ill. K4	.187
Crawfordsville,Ind. M8	.182
Donora,Pa. A7	176†
Duluth A7	176†
Fairfield,Ala. T2	176†
Houston,Tex. S5	181**
Jacksonville,Fla. M8	.187
Johnstown,Pa.(43) B2	.180*
Joliet,Ill. A7	176†
Kansas City,Mo. S5	.181**
Kokomo,Ind. C16	178†
Minnequa,Colo. C10	.181**
Monessen,Pa. 9 ga. P7	185*
Pittsburg,Calif. C11	..199†
Rankin,Pa. A7	176†
S Chicago,Ill. R2	176**
Sterling,Ill. (1) N15	180*

WIRE (16 gage)	An'ld Galv. Stone	Stone
Ala. City,Ala. R2	15.70	17.25**
Aliq'ppa,Pa. J5	15.70	17.50
Bartonville K4	16.10	18.05
Buffalo W12	16.10	....
Cleveland A7	15.70	17.25†
Crawf'dsville M8	15.80	17.75
Fostoria,O. S1	16.20	17.75†
Houston S5	15.95	17.50**
Jacksonville M8	16.05	18.00
Johnstown B2	16.10	18.05*
Kan. City,Mo. S5	15.95	17.50**
Kokomo C16	15.80	17.35†
Minnequa C10	16.05	17.75**
P'im'r,Mass. W2	16.10	17.65*
Pitts.,Calif. C11	16.05	17.60†
Sparrows Pt. B2	16.20	18.15*
Sterling(1) N15	16.10	18.05*
Waukegan A7	15.70	17.25†
Worcester A7	16.00	....

WIRE, Merchant Quality (6 to 8 gage)	An'ld Galv.
Ala. City,Ala. R2	7.95 8.35**
Aliquippa J5	7.95 8.475§
Atlanta A11	8.05 8.65*
Bartonville(48) K4	8.20 8.80
Buffalo W12	8.10 8.50†
Cleveland A7	7.95 ....
Crawfordsville M8	8.05 8.65
Donora,Pa. A7	7.95 8.35†
Duluth A7	7.95 8.35†
Fairfield T2	7.95 8.35†
Houston(48) S5	8.20 8.60**
Jacks'ville,Fla. M8	8.30 8.90
Johnstown B2(48)	7.95 8.55*
Joliet,Ill. A7	7.95 8.35†
Kans. City(48) S5	8.20 8.60**
Kokomo C16	8.05 8.45†
Los Angeles B3	8.90 9.50*
Minnequa C10	8.20 8.60**
Monessen P7 (48)	8.10 8.70*
Palmer,Mass. W12	8.40 8.80*
Pitts.,Calif. C11	8.90 9.30†
Portsmouth,O. P12	7.95 ....
Rankin,Pa. A7	7.95 8.35†
S Chicago R2	7.95 8.35**
S San Fran. C10	8.90 9.30**
Spar'wsPt. B2(48)	8.05 8.65*
Sterling(1)(48) N15	7.95 8.55*
Struth'rs,O.(48) Y1	7.95 8.45†
Worcester,Mass. A7	8.25 8.65†

Based on zinc price of: *13.50c. †5c. §10c. ‡Less than 10. ††13c. **Subject to zinc equalization extras.

BALE TIES, Single Loop Col.

Alabama City,Ala. R2	.190
Atlanta A11	.192
Bartonville,Ill. K4	.197
Crawfordsville,Ind. M8	.192
Donora,Pa. A7	.190
Duluth A7	.190
Fairfield,Ala. T2	.190
Houston S5	.195
Jacksonville,Fla. M8	.197
Joliet,Ill. A7	.190
Kansas City,Mo. S5	.195
Kokomo,Ind. C16	.192
Minnequa,Colo. C10	.195
Pitts.,Calif. C11	.214
S Chicago,Ill. R2	.190
S San Francisco C10	.214
Sterling,Ill. N15	.190
Sparrows Point,Md. B2	.192
Tonawanda,N.Y. B12	.169
Williamsport,Pa. S19	.175

FENCE POSTS

Chicago Hts.,Ill. C2, I-2	.167
Duluth A7	.167
Franklin,Pa. F5	.167
Huntington,W.Va. W7	.169
Johnstown,Pa. B2	.167
Marion,O. P11	.167
Minnequa,Colo. C10	.172
Sterling,Ill. N15	.167
Tonawanda,N.Y. B12	.169
Williamsport,Pa. S19	.175

FASTENERS

(Base discounts, full container quantity, per cent off list, f.o.b. mill)

BOLTS

Carriage, Machine Bolts

Full Size Body (cut thread)

½ in. and smaller;	
6 in. and shorter..	55
Longer than 6 in. ..	46.5
⅝ in. thru 1 in.:	
6 in. and shorter ..	46.5
Longer than 6 in. ..	44
1⅛ in. and larger:	
All lengths	44

Undersized Body (rolled thread)

½ in. and smaler:	
6 in. and shorter ..	55

Carriage, Machine, Lag Bolts Hot Galvanized:

½ in. and smaller:	
6 in. and shorter ..	35
Longer than 6 in. ..	23
⅝ in. thru 1 in.:	
6 in. and shorter ..	20
Longer than 6 in. ..	20
1⅛ in. and larger:	
All lengths	20

Lag Bolts

All diameters:	
6 in. and shorter	55
Longer than 6 in. ..	47

Plow and Tap Bolts

½ in. and smaller by 6 in. and shorter	54
Larger than ½ in. or longer than 6 in.	47

Blank Bolts	47
Step, Elevator, Tire Bolts	54

NUTS

Reg. & Heavy Square Nuts:

All sizes	59

Square Nuts, Reg. & Heavy, Hot Galvanized:

All sizes	45

Hex Nuts, Reg. & Heavy, Hot Pressed:

⅜ in. and smaller .	63
⅞ in. to 1 in., incl.	59.5
1⅛ in. to 1½ in., incl.	64
1⅝ in. and larger ..	58

Hex Nuts, Reg. & Heavy, Cold Punched:

⅜ in. and smaller..	63
⅞ in. to 1½ in., incl.	59.5
1⅝ in. and larger .	58

Hex Nuts, All Types, Hot Galvanized:

⅜ in. and smaller..	50
⅞ in. to 1 in., incl.	46
1⅛ in. to 1½ in., incl.	51

Hex Nuts, Semifinished, Reg. & Heavy (Incl. Slotted):

⅜ in. and smaller..	63
⅞ in. to 1½ in., incl.	59.5
1⅝ in. and larger ..	58

Hex Nuts, Finished (Incl. Slotted and Castellated):

1 in. and smaller ..	65
1⅛ in. to 1½ in., incl.	62
1⅝ in. and larger..	58

CAP AND SET SCREWS

(Base discounts, packages, per cent off list, f.o.b. mill)

Hex Head Cap Screws, Coarse or Fine Thread, Bright:

6 in. and shorter:	
⅝ in. and smaller..	47
¾, ⅞ and 1 in. diam.	31
Longer than 6 in.:	
⅝ in. and smaller..	18.5
¾, ⅞ and 1 in. diam.	5.5

High Carbon, Heat Treated:

6 in. and shorter:	
⅝ in. and smaller..	34
¾, ⅞ and 1 in. diam.	13
Longer than 6 in.:	
⅝ in. and smaller diam.	+1
¾, ⅞ and 1 in. diam.	+19

Fillister Head, Coarse Thread:

Listed Sizes	+31

Flat Head, Coarse Thread:

¼ in. and smaller by 6 in. and shorter..	+57

Set Screws, Square Head, Cup Point, Coarse Thread:

Through 1 in. diam.:	
6 in. and shorter ..	11
Longer than 6 in. ..	+10

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great.

Structural ½-in., larger 10.85
⅞-in. under List less 26.5%

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut lengths 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	23.56	22.84
1¼	13	....	27.92	22.68
1½	13	26.34	30.86	25.06
1¾	13	31.12	36.45	29.64
2	13	34.88	40.85	33.21
2¼	13	39.29	46.01	37.42
2½	12	42.64	49 94	40.61
2½	12	46.98	55.01	44.73
2¾	12	50.86	59.57	48.44
3	12	54.24	63.53	51.66

RAILWAY MATERIALS

	Standard No. 1	Standard No. 2	Toe Rails All	Toe Rails 60 lb Under
RAILS				
Bessemer,Pa. U5	5.075	4.975	5.025	6.00
Ensley,Ala. T2	5.075	4.975	....	6.00
Fairfield, Ala. T2	....	....	....	6.00
Gary,Ind. U5	5.075	4.975	5.025	....
Huntington,W.Va. W7	....	....	....	6.15
Indiana Harbor,Ind. I-2	5.075	4.975	5.025	....
Johnstown,Pa. B2	....	....	...(16)	6.00
Lackawanna,N.Y. B2	5.075	4.975	...(16)	6.00
Minnequa,Colo. C10	5.075	4.975	....	6.50
Steelton,Pa. B2	5.075	4.975	....	....
Williamsport,Pa. S19	....	....	....	6.15

TIE PLATES

Fairfield,Ala. T2	6.025
Gary,Ind. U5	6.025
Ind. Harbor,Ind. I-2	6.025
Lackawanna,N.Y. B2	6.025
Minnequa,Colo. C10	6.025
Seattle B3	6.175
Steelton,Pa. B2	6.025
Torrance,Calif. C11	6.175

JOINT BARS

Bessmer,Pa. U5	6.35
Fairfield,Ala. T2	6.35
Ind. Harbor,Ind. I-2	6.35
Joliet,Ill. U5	6.35
Lackawanna,N.Y. B2	6.35
Minnequa,Colo. C10	6.35
Steelton,Pa. B2	6.35

AXLES

Ind. Harbor,Ind. S13	8.10
Johnstown,Pa. B2	8.10

TRACK BOLTS, Untreated

Cleveland R2	13.10
Lebanon,Pa. B2	13.10
Minnequa,Colo. C10	13.10
Pittsburgh P14	13.10
Seattle B3	13.60

SCREW SPIKES

Cleveland R2	12.85
Pittsburgh P14	12.85

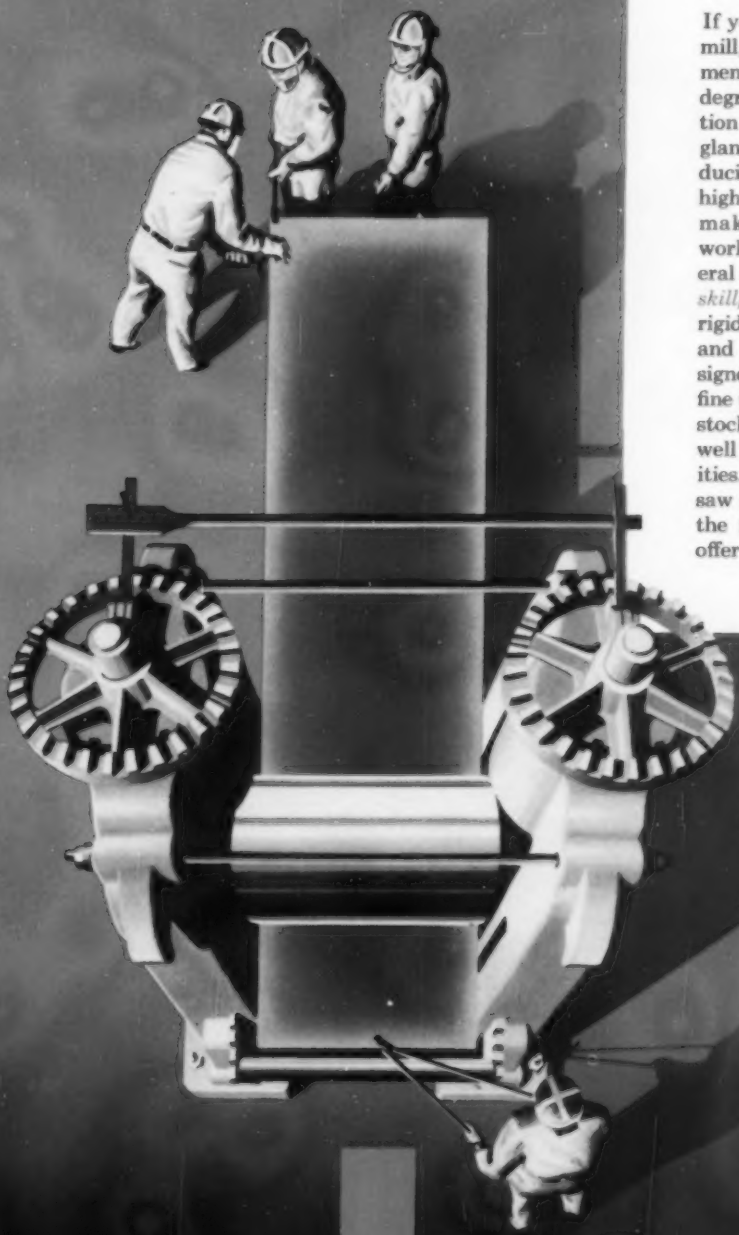
STANDARD TRACK SPIKES

Fairfield,Ala. T2	8.775
Ind. Harbor,Ind. I-2, Y1	8.775
Kansas City,Mo. S5	8.775
Lebanon,Pa. B2	8.775
Minnequa,Colo. C10	8.775
Pittsburgh J5	8.775
Seattle B3	9.275
S Chicago,Ill. R2	8.775
Struthers,O. Y1	8.775
Youngstown R2	8.775

Footnotes

(1) Chicago base.
(2) Angles, flats, bands.
(3) Merchant.
(4) Reinforcing.
(5) 1¼ to under 1 7/16 in.; 1 7/16 to under 1 5/16 in.; 8.25c; 1 15/16 to 8 in.; inclusive, 6.60c.
(6) Chicago or Birm. base.
(7) To jobbers, 3 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(10) Pittsburgh base.
(11) Cleveland & Pitts. base.
(12) Worcester, Mass., base.
(13) Add 0.25c for 17 Ga. & heavier.
(14) Gage 0.143 to 0.249 in.; for gage 0.142 and lighter, 5.80c.
(15) ¾" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(18) To dealers.
(19) Chicago & Pitts. base.
(20) Plus 1c per 100 lb.
(21) New Haven, Conn., base.
(22) Deld. San Francisco Bay area.
(23) Special quality.
(24) Deduct 0.05c, finer than 15 Ga.
(25) Bar mill bands.
(26) Delivered in mill zone, 5.625c.
(27) Bar mill sizes.
(28) Bonderized.
(29) Youngstown base.
(30) Sheared; for universal mill add 0 45c.
(31) Widths over ⅝-in.; 7.30c, for widths ⅝-in and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) To jobbers, deduct 20c.
(34) 9.60c for cut lengths.
(35) 72" and narrower.
(36) 54" and narrower.
(38) 14 Ga. & lighter; 48" & narrower
(39) 48" and narrower.
(40) Lighter than 0.035"; 0.035" and heavier, 0.25c higher.
(41) 9.10c for cut lengths.
(42) Mill lengths, f.o.b. mill; deld. in mill zone or within switching limits, 5.625c.
(43) 9-14½ Ga.
(48) 6-7 Ga.
(49) 3½in. and smaller rounds; 8.65c, over 3½-in. and other shapes.

How Jessop skill makes better saw steel



If you could peer down into the Jessop mill, chances are you'd see groups of men hand-rolling sheets of steel with a degree of skill and careful concentration that might seem excessive at first glance. *Yet it isn't.* These men are producing a very special steel—top quality high-speed sheet which is used in the making of hack-saw blades, woodworking tools, metal-slitting saws, general industrial knives, and the like. But *skillful finish rolling isn't all.* Jessop rigidly controls its melting formulas and pours small ingots specially designed for cross rolling. This insures a fine uniform grain structure so that the stock blanks well, forms well, swages well and has superior edge holding qualities. Remember, when you order your saw steel from Jessop, you are buying the finest that Jessop experience can offer. *And that's mighty fine steel.*

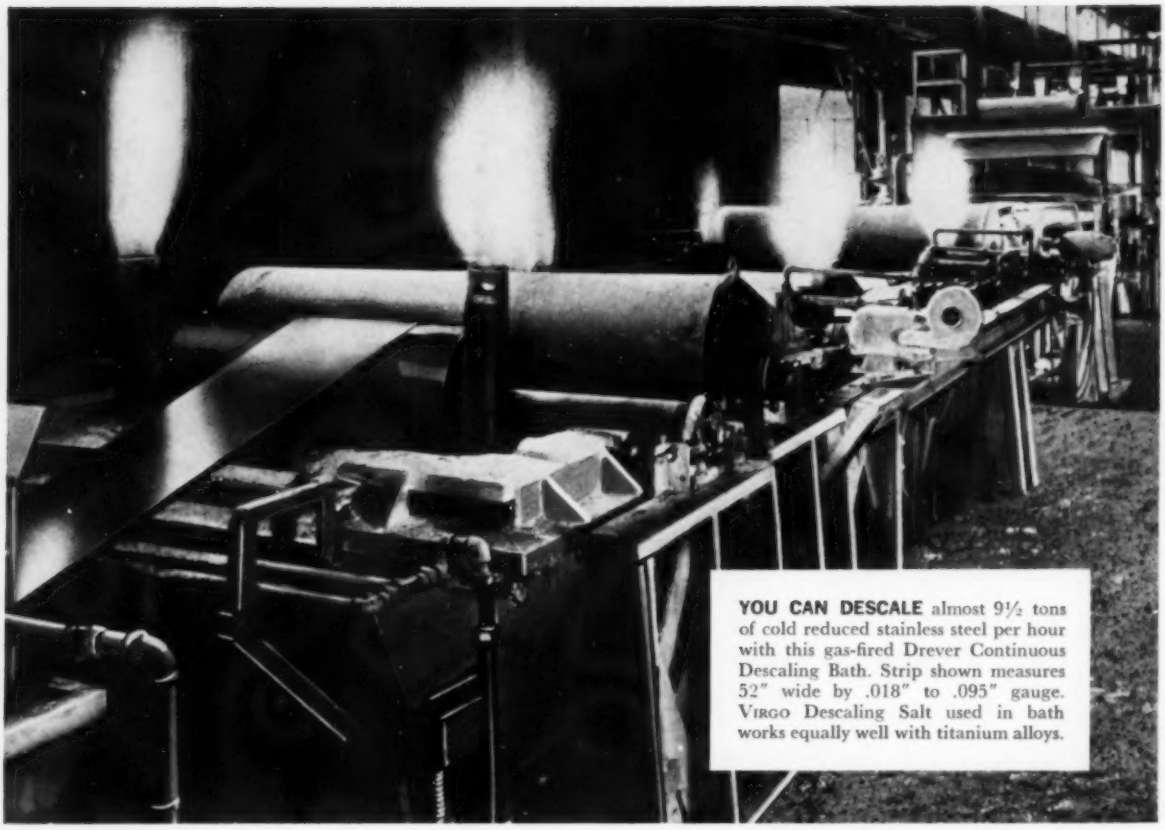
JESSOP

STEEL COMPANY • WASHINGTON, PENNSYLVANIA

OFFICES IN PRINCIPAL CITIES

Jessop Steel of Canada Limited, Wallaceburg, Toronto

Jessop Steel International Corp., Chrysler Building, New York, New York



YOU CAN DESCALE almost 9½ tons of cold reduced stainless steel per hour with this gas-fired Drever Continuous Descaling Bath. Strip shown measures 52″ wide by .018″ to .095″ gauge. VIRGO Descaling Salt used in bath works equally well with titanium alloys.

VIRGO® SALT descales 18,700 lbs. of stainless strip in one hour

You, too, can accelerate your descaling speed to synchronize with production, when you use VIRGO Descaling Salt.

Equally important are the economy and safety you get when you use VIRGO.

Steel and titanium—one bath • You can descale both stainless steel and titanium alloys with the same salt bath.

Fast • The salt is so effective in making surface coatings acid-soluble, that you can remove the coating in one-tenth to one-hundredth the usual pickling time.

Safe for metals • VIRGO Descaling Salt reacts only with scale—and with no loss of base metal. There is no danger of hydrogen embrittlement when descaling titanium.

Safe for personnel • The VIRGO bath is simple and safe to operate when normal precautions are observed. Bath temperatures range from 800° to 1250°F., depending on the application.

Any form • Descale strip, sheet, bars, wire, tubes, or any other form to a chemically clean surface.

Acid disposal less of a problem • You can reduce the problems of spent acid disposal since the VIRGO process decreases acid consumption.

To find out more specifically how VIRGO Descaling Salt gives you bright, clean surfaces—at speeds to match your production requirements—write for Bulletins 25 and 25-T, stating the application you are considering.

Help for your metal cleaning operations

Get the benefit of Hooker's basic chemical experience for your metal cleaning operations. Make Hooker your source for chemicals if you're:

Desanding • Use VIRGO Electrolytic Salt to remove sand, graphite, other impurities —produce a chemically clean surface.

Reclaiming parts loaded with carbon or rust • VIRGO Molten Cleaner works fast—is the quick answer for large-scale salvage operations.

Vapor degreasing • You get unique stability—degrease more parts between clean-outs—using NIALK® TRICHLOROethylene with **psp** (permanent staying power).

Stripping, acid neutralizing • You can get Hooker caustic soda in *four* convenient flake sizes, in new easy-to-empty drums with 18″ openings.

Acid cleaning, pickling • You can get Hooker muriatic acid in 4,000-, 6,000-, or 8,000-gallon tank cars.

Plating with tin-zinc, tin, silver, copper • Get the benefit of more than 50 years' experience in potash production, when you specify NIALK® caustic potash for your plating operations.

For literature on any of these Hooker Chemicals for metals, just write us on your business letterhead.

HOOKER ELECTROCHEMICAL COMPANY

1201 UNION STREET, NIAGARA FALLS, N. Y.

NIAGARA FALLS • TACOMA • MONTAGUE, MICH. • NEW YORK • CHICAGO • LOS ANGELES

HOOKER CHEMICALS PLASTICS

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft.	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+2	+20	4.5	+14.25	7	+11.75	8.5	+10.25	8.5	+10.25	8.25	+10.5	10.75	+8
Ambridge, Pa. N2	+2	....	4.5	....	7	....	8.5	....	8.5	....	8.25	....	10.75	....
Lorain, O. N3	+2	+20	4.5	+14.25	7	+11.75	8.5	+10.25	8.5	+10.25	8.25	+10.5	10.75	+8
Youngstown Y1	0.5	+17.5	4.5	+14.25	7	+11.75	8.5	+10.25	8.5	+10.25	8.25	+10.5	10.75	+8

ELECTRIC WELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	+2	+20	4.5	+14.25	7	+11.75	8.5	+10.25	8.5	+10.25	8.25	+10.5	10.75	+8

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	12.5	+6.75	15.5	+2.75	18	0.75	20.5	2.5
Alton, Ill. L1	....	....	....	....	....	....	10.5	+3.75	13.5	+4.75	16	+1.25	18.5	0.5
Benwood, W. Va. W10	10	+20.5	+0.25	+27.75	+9.75	+37.25	12.5	+6.75	15.5	+2.75	18	0.75	20.5	2.5
Butler, Pa. F6	10	+20.5	0.5	+27	+8.5	+36	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	12.5	+6.75	15.5	+2.75	18	0.75	20.5	2.5
Fairless, Pa. N3	....	....	....	....	....	....	10.5	+8.75	13.5	+4.75	16	+1.25	18.5	0.5
Fontana, Calif. K1	....	....	....	....	....	....	+0.5	+19.75	2.5	+15.75	5	+12.5	7.5	+10.5
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	11.5	+7.75	14.5	+3.75	17	+0.25	19.5	1.5
Lorain, O. N3	....	....	....	....	....	....	12.5	+6.75	15.5	+2.75	18	0.75	20.5	2.5
Sharon, Pa. S4	11	+19.5	1.5	+26	+7.5	+35	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	12.5	+6.75	15.5	+2.75	18	0.75	20.5	2.5
Sparrows Pt., Md. B2	9	+21.5	0.5	+28	+9.5	+37	10.5	+8.75	13.5	+4.75	16	+1.25	18.5	0.5
Wheatland, Pa. W9	11	+19.5	1.5	+26	+7.5	+35	12.5	+6.75	15.5	+2.75	18	0.75	20.5	2.5
Youngstown R2, Y1	....	....	....	....	....	....	12.5	+6.75	15.5	+2.75	18	0.75	20.5	2.5

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.73		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	21	3.5	21.5	4	23	4.75	23	4.75	....	....	....	....
Alton, Ill. L1	19	1.5	19.5	2	21	2.75	21	2.75	....	....	....	....
Benwood, W. Va. W10	21	3.5	21.5	4	23	4.75	23	4.75	13.5	+0.75	13.5	+5.25
Etna, Pa. N2	21	3.5	21.5	4	23	4.75	23	4.75	13.5	+5.25	13.5	+5.25
Fairless, Pa. N3	19	1.5	19.5	2	21	2.75	21	2.75	11.5	+7.25	11.5	+7.25
Fontana, Calif. K1	8	+9.5	8.5	+9	10	+8.25	10	+8.25	0.5	+18.25	0.5	+18.25
Indiana Harbor, Ind. Y1	20	2.5	20.5	3	22	3.75	22	3.75	12.5	+6.25	12.5	+6.25
Lorain, O. N3	21	3.5	21.5	4	23	4.75	23	4.75	....	....	....	....
Sharon, Pa. M6	21	3.5	21.5	4	23	4.75	23	4.75	....	....	....	....
Sparrows Pt., Md. B2	19	1.5	19.5	2	21	2.75	21	2.75	11	+7.25	11	+7.25
Wheatland, Pa. W9	21	3.5	21.5	4	23	4.75	23	4.75	13.5	+5.25	13.5	+5.25
Youngstown R2, Y1	21	3.5	21.5	4	23	4.75	23	4.75	13.5	+5.25	13.5	+5.25

*Galvanized pipe discounts based on current price of zinc (13.50c, East St. Louis).

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	—Rerolling— Ingot	Slabs	Forging Billets	H.R. Strip	Wire Rods; C.F. Wire	Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	21.25	26.00	....	34.50	....	....	....	46.75	43.25
202	22.75	29.00	35.00	37.50	39.25	41.25	43.25	47.25	47.25
301	22.25	27.00	35.75	35.75	40.25	42.50	44.50	49.25	45.75
302	24.25	30.25	36.50	39.00	41.00	43.25	45.50	50.00	50.00
302B	24.50	31.50	39.25	44.00	43.25	45.50	47.50	54.75	54.75
303	....	30.75	39.50	....	44.00	46.25	48.00	54.50	54.50
304	26.00	32.00	39.00	42.50	43.75	46.00	48.75	53.25	53.25
304L	....	....	46.50	49.50	51.25	53.50	56.25	60.75	60.75
305	27.50	35.25	40.75	45.75	43.75	46.00	49.25	54.50	54.50
308	29.50	36.75	45.50	48.25	50.75	53.50	58.00	60.50	60.50
309	38.25	47.50	55.50	62.00	61.25	64.50	68.25	77.50	77.50
310	47.75	59.25	75.00	81.00	83.25	87.50	89.25	93.00	93.00
314	....	....	....	....	83.25	....	80.25	....	100.50
316	38.25	47.50	59.75	66.50	66.75	70.25	73.75	78.25	78.25
316L	....	....	67.25	73.00	74.25	77.25	81.25	85.75	85.75
317	46.25	57.75	73.75	84.75	83.00	87.25	90.00	97.00	97.00
321	31.00	38.50	45.25	51.50	50.50	53.25	57.50	63.00	63.00
18-8 CbTa	35.50	44.75	53.50	61.00	59.25	62.25	67.00	76.25	76.25
403	....	....	30.75	....	34.50	36.25	38.75	46.50	46.50
405	18.75	24.50	28.50	34.50	32.50	34.00	36.00	45.00	45.00
410	16.00	20.75	27.25	29.75	31.00	32.50	33.75	38.75	38.75
416	....	....	27.75	....	31.50	33.00	34.75	46.50	46.50
420	....	32.25	33.00	40.25	37.75	39.75	43.50	59.50	59.50
430	16.25	21.00	27.75	30.75	31.50	33.00	34.50	39.25	39.25
430F	....	....	28.25	....	32.00	33.50	35.25	49.75	49.75
431	....	27.75	36.25	....	40.25	42.50	44.25	53.75	53.75
446	....	....	37.75	56.75	42.50	44.75	46.00	67.25	67.25

Stainless Steel Producers Are: Allegheny Ludlum Steel Corp.; Alloy Metal Wire Div., H. K. Porter Co. Inc.; Alloy Tube Div., Carpenter Steel Co.; American Steel & Wire Div., U.S. Steel Corp.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; G. O. Carlson Inc.; Charter Wire Products Co.; Cold Metal Products Co.; Crucible Steel Co. of America; Damascus Tube Co.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Elwood Ivins Steel Tube Works Inc.; Firth Sterling Inc.; Ft. Wayne Metals Inc.; Globe Steel Tubes Co.; Helical Tube Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Joslyn Mfg. & Supply Co.; Kenmore Metals Corp.; Maryland Fine & Specialty Wire Co.; McInnes Steel Co.; McLouth Steel Corp.; Metal Forming Corp.; National-Standard Co.; National Tube Div., U.S. Steel Corp.; Newman-Crosby Steel Co.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Rodney Metals Inc.; Rome Mfg. Co.; Rotary Electric Steel Co.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Specialty Wire Co. Inc.; Spencer Wire Corp.; Stainless Welded Products Inc.; Standard Tube Co.; Superior Steel Corp.; Superior Tube Co.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co.; Tube Methods Inc.; Ulbrich Stainless Steels; United States Steel Corp.; Universal-Cyclops Steel Co.; Wallingford Steel Co.; Washington Steel Corp.

Clad Steel

	Plates 5%	Plates Carbon Base 10%	Plates Carbon Base 15%	Plates Carbon Base 20%	Sheets Carbon Base 20%
Stainless					
302	....	....	....	....	35.50
304	33.15	36.20	40.30	44.50	37.75
304-L	35.40	38.80	43.15	47.65	....
316	38.35	41.60	45.90	50.15	55.50
316-L	43.55	47.60	52.70	57.85	....
316-Cb	43.85	48.10	53.40	58.75	....
321	34.90	37.95	42.10	46.40	44.75
347	37.05	41.25	46.45	51.70	54.25
405	27.55	29.20	33.15	37.05	....
410	27.00	28.70	32.65	36.55	....
430	27.00	28.70	32.65	36.55	....
Inconel	47.28	57.90	68.50	79.20	....
Nickel	40.00	50.30	60.65	71.05	....
Nickel, Low Carbon	40.30	50.95	61.65	72.50	....
Monel	41.70	51.90	62.15	72.40	....
Copper*	....	....	....	....	46.00

	Strip, Carbon Base —Cold Rolled— 10%	Both Sides
*Copper**	*33.50*	*40.85*

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. C22, Coatesville, Pa. L7, New Castle, Ind. I-4 and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb
Regular Carbon	0.290
Extra Carbon	0.345
Special Carbon	0.41-0.45
Oil Hardening	0.450

Grade	$ per lb
Cr Hot Work	0.45-0.495
W-Cr Hot Work	0.043-0.475
V-Cr Hot Work	0.460
Hi-Carbon-Cr	0.830

Grade by Analysis (%)

W	Cr	V	Co	Mo		$ per lb
20.25	4.25	1.6	12.25	....	....	4.170
18.25	4.25	1	4.75	....	....	2.385
18	4	2	9	....	....	2.7575
18	4	2	....	....	....	1.845
18	4	1	....	....	....	1.680
9	3.5	..	....	....	....	1.275
13.5	4	3	....	....	....	1.945
13.75	3.75	2	5	....	....	2.325
6.4	4.5	1.9	....	5	....	1.185
6	4	3	....	6	....	1.430
1.5	4	1	....	8.5	....	1.040

Tool steel producers include: A4, A8, B2, B8, C4, C9, C13, C18, F2, J3, L3, M14, S8, U4, V2, and V3.

Pig Iron

F.o.b. furnace prices in dollars per gross ton, as reported to STEEL. Minimum delivered prices are approximate and do not include 3% federal tax.

Birmingham District	Basic	No. 2 Foundry	Malleable	Bessemer
AlabamaCity,Ala. R2	58.50	59.00	....	....
Birmingham R2	58.50	59.00‡	....	....
Birmingham U6	....	59.00‡	63.00	....
Woodward,Ala. W15	58.50	59.00‡	63.00	....
Cincinnati, deld.	....	66.70	....	....
Buffalo District				
Buffalo H1, R2	62.50	63.00	63.50	64.00
Tonawanda,N.Y. W12	62.50	63.00	63.50	64.00
N.Tonawanda,N.Y. T9	....	63.00	63.50	64.00
Boston, deld.	73.79	74.29	74.79	....
Rochester,N.Y., deld.	65.52	66.02	66.52	....
Syracuse,N.Y., deld.	66.62	67.12	67.62	....
Chicago District				
Chicago I-3	62.50	63.00	63.00	63.50
Gary,Ind. U5	62.50	....	63.00	....
S.Chicago,Ill. R2	62.50	....	63.00	....
S.Chicago,Ill. Y1	62.50	63.00	63.00	....
S.Chicago,Ill. U5	62.50	....	63.00	63.50
S.Chicago,Ill. W14	62.50	....	63.00	63.50
Milwaukee, deld.	64.96	65.46	65.46	65.96
Muskegon,Mich., deld.	....	76.83	76.83	....
Cleveland District				
Cleveland R2, A7	62.50	63.00	63.00	63.50
Akron,O., deld.	65.25	65.75	65.75	66.25
Mid-Atlantic District				
Birdsboro,Pa. B10	64.50	65.00	65.50	66.00
Chester,Pa. P4	64.50	65.00	65.50	....
Philadelphia, deld.	66.26	66.76	67.26	....
Swedeland,Pa. A3	64.50	65.00	65.50	66.00
New York, deld.	....	71.20	71.70	....
Newark,N.J., deld.	68.52	69.02	69.52	70.02
Philadelphia, deld.	66.38	66.88	67.38	67.88
Troy,N.Y. R2	64.50	65.00	65.50	66.00
Pittsburgh District				
NevilleIsland,Pa. P6	62.50	63.00	63.00	63.50
Pittsburgh (N&8 sides), Aliquippa, deld.	....	64.45	64.45	64.98
McKeesRocks,Pa., deld.	....	64.10	64.10	64.63
Lawrenceville, Homestead, Wilmerding, Monaca,Pa., deld.	....	64.76	64.76	65.29
Verona, Trafford,Pa., deld.	64.79	65.32	65.32	65.85
Brackenridge,Pa., deld.	65.10	65.60	65.60	66.13
Bessemer,Pa. U5	62.50	....	63.00	63.50
Clairton,Rankin,S.Duquesne,Pa. U5	62.50	....	....	....
Midland,Pa. C18	62.50	....	....	....

Youngstown District	Basic	No. 2 Foundry	Malleable	Bessemer
Hubbard,O. Y1	....	....	63.00	....
Sharpsville,Pa. S6	62.50	....	63.00	63.50
Youngstown Y1	....	....	63.00	63.50
Mansfield,O., deld.	67.40	....	67.90	68.40
Duluth I-3	62.50	63.00	63.00	63.50
Erie,Pa. I-3	62.50	63.00	63.00	63.50
Everett,Mass. E1	64.50	65.00	65.50	....
Fontana,Calif. K1	70.50	71.00	....	....
Geneva,Utah C11	62.50	63.00	....	....
GraniteCity,Ill. G4	64.40	64.90	65.40	....
Ironton,Utah C11	62.50	63.00	....	....
LoneStar,Tex. L6	58.50*	59.00†	....	....
Minnequa,Colo. C10	64.50	65.00	65.50	....
Rockwood,Tenn. T3	....	59.00‡	63.00	....
Toledo,O. I-3	62.50	63.00	63.00	63.50
Cincinnati, deld.	68.26	68.76	....	....

*Phos. 0.51-0.75%; Phos. 0.31-0.50%, $59.50.
†Phos. 0.51-0.75%; Phos. 0.31-0.50%, $60.
‡Phos. 0.70-0.90%; intermediate (Phos. 0.31-0.69%), $60.

PIG IRON DIFFERENTIALS

Silicon: Add 50 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%.

Manganese: Add 50 cents per ton for each 0.50% manganese over 1% or portion thereof.

Nickel: Under 0.50% no extra; 0.50-0.74%, inclusive, add $2 per ton and each additional 0.25%, add $1 per ton.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.00-6.50% silicon; add $1.25 for each 0.5% Si; 75 cents for each 0.50% Mn over 1%)

Jackson,O. I-3, J1	71.50
Buffalo H1	72.75

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

CalvertCity,Ky. P15	$105.50
Niagara Falls,N.Y. P15	105.50
Keokuk,Iowa, Open-hearth & Fdry, freight allowed K2	110.00
Keokuk, O.H. & Fdry, 12½ lb piglets, 16% Si, frgt allowed K2	113.00

LOW PHOSPHORUS PIG IRON, Gross Ton

Lyles,Tenn. T3 (Phos. 0.035% max)	$76.50
Rockwood,Tenn. T3 (Phos. 0.035% max)	76.50
Troy,N.Y. R2 (Phos. 0.035% max)	70.50
Philadelphia, deld.	78.26
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	67.50
Duluth I-3 (Intermediate) (Phos. 0.036-0.075% max)	67.50
Erie,Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max)	67.50
NevilleIsland,Pa. P6 (Intermediate) (Phos. 0.036-0.075% max)	67.50

Warehouse Steel Products

Representative prices, per pound, subject to extras, f.o.b. warehouse. City delivery charges are 15 cents per 100 lb except: St. Paul, 25 cents; Moline, Norfolk, Richmond, Washington, 20 cents; Baltimore, Boston, Los Angeles, New York, Philadelphia, Portland, San Francisco, Spokane, 10 cents; Atlanta, Houston, Seattle no charge.

	SHEETS				STRIP	BARS				Standard Structural Shapes	PLATES	
	Hot-Rolled	Cold-Rolled	Gal. 10 Ga.†	Stainless Type 302	Hot-Rolled*	H.R. Merchant Qual.	H.R. Spec. Qual.	C.F. Rds.‡	H.R. Alloy 4140††		Carbon	Floor
Atlanta	8.07‖	9.27‖	9.83‖	....	8.16	8.30	...	10.14	....	8.44	8.40	10.22
Baltimore	7.79	8.99	9.12	....	8.27	8.34	8.87	9.09[3]	15.69	8.57	8.12	10.81
Birmingham	7.80‖	9.00‖	9.52‖	....	7.82	7.91	8.44	10.12	...	8.20	8.16	10.06
Boston	8.84	9.88	11.02	....	8.89	8.88	9.43	10.71	14.49	9.10	9.18	10.44
Buffalo	7.85	9.00	11.71	....	8.05	8.00	8.70	8.70	14.30	8.50	8.50	9.80
Chattanooga	8.00‖	9.20‖	9.10‖	....	8.05	8.13	8.66	10.04	...	8.42	8.38	10.02
Chicago	7.80	9.00	9.70	....	7.82	7.91	8.44	8.35	13.95	8.20	8.16	9.26
Cincinnati	7.94	9.05	9.75	....	8.14	8.19	8.72	8.82	14.23	8.74	8.52	9.53
Cleveland	7.78	8.98	9.60	....	7.92	7.99	8.52	8.60	14.03	8.57	8.39	9.46
Denver	9.55	11.00	12.41	....	9.70	9.75	...	10.54	18.89	9.60	9.50	11.15
Detroit	8.03	9.25	11.55	....	8.17	8.18	8.71	8.68	14.21	8.74	8.51	9.51
Erie, Pa.	7.75	8.88	9.60[10]	....	7.90	8.00	8.65	8.70[10]	....	8.35	8.20	9.50
Houston	8.70	9.65	10.99	....	8.80	8.95	9.50	10.55	15.00	8.90	8.60	10.10
Jackson, Miss.	8.10‖	9.30‖	9.79‖	....	8.15	8.23	8.76	10.23	...	8.52	8.48	10.11
Los Angeles	8.90	10.65	11.65	....	9.10	8.80	9.50	11.70	15.25	8.95	9.35	11.50
Milwaukee	7.93	9.13	9.82	....	7.95	8.03	8.56	8.57	14.07	8.41	8.29	9.38
Moline, Ill.	8.05	9.25	10.05	....	8.13	8.26	...	8.70	....	7.78	8.36	...
New York	8.45	9.66	10.23	60.20	8.90	8.83	9.38	10.61	14.39	8.91	9.01	10.07
Norfolk, Va.	7.85	...	...	....	8.30	8.35	...	10.80	....	8.60	8.10	9.60
Philadelphia	8.15	9.07	10.02	....	8.82	8.55	9.08	9.31	14.31	8.70	8.68	9.70
Pittsburgh	7.78	8.99	10.05	60.00	7.92	7.91	8.44	8.60	13.95	8.20	8.16	9.26
Portland, Oreg.	8.90	9.65	11.40	....	9.05	8.95	...	13.55	14.60	8.90	8.70	11.60
Richmond, Va.	8.05	...	10.09	....	8.45	8.70	9.29	10.00	....	8.80	8.35	9.70
St. Louis	8.14	9.34	10.03	....	8.19	8.25	8.78	8.93	14.28	8.67	8.52	9.59
St. Paul	8.29	9.49	10.31	....	8.39	8.52	...	9.21	....	8.75	8.71	9.87
San Francisco	8.75	10.30	10.80	....	8.95	8.80	9.35	12.30	15.25	8.85	8.85	11.15
Seattle	9.35	10.45	11.55	....	9.50	9.30	9.85	13.15	15.55	9.15	9.05	11.25
Spokane, Wash.	9.35	10.45	11.55	....	9.50	9.30	9.85	13.15	16.30	9.15	9.05	11.25
Washington	8.37	10.57	...	....	9.06	8.92	...	9.67	....	9.15	8.70	10.14

*Prices do not include gage extras; †prices include gage and coating extras (based on 12.50c zinc at Los Angeles and 13.50c at other points), except in Birmingham (coating extra excluded); ‡includes 35-cent bar quality extras; **⅛-in. and heavier; ††as annealed; ‖42 in. and under.

Base quantities, 2000 to 4999 lb except as noted; cold-rolled strip and cold-finished bars, 2000 lb and over except in Seattle, 2000 to 9999 lb, and in Los Angeles, 6000 lb and over; stainless sheets, 8000 lb except in Chicago, New York and Boston, 10,000 lb and in San Francisco, 2000 to 4999 lb; hot-rolled products on West Coast, 2000 to 9999 lb; [3]—400 to 999 lb; [8]—1000 to 1999 lb; [6]—2000 to 3999 lb; [10]—2000 lb and over.

Refractories

Fire Clay Brick (per 1000)

High-Heat Duty: Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beach Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parral, Portsmouth, O., Ottawa, Ill., Stevens Pottery, Ga., $128; Salina, Pa., $133; Niles, O., $138; Cutler, Utah, $148.

Super-Duty: Ironton, O., Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Pa., New Savage, Md., St. Louis, $165; Stevens Pottery, Ga., $175.

Silica Brick (per 1000)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Pt. Matilda, Pa., Portsmouth, O., Hawstone, Pa., $140; Warren, Niles, Windham, O., Hays, Latrobe, Morrisville, Pa., $145; E. Chicago, Ind., Joliet, Rockdale, Ill., $150; Lehigh, Utah, $165; Los Angeles, $170.

Super-Duty: Hays, Sproul, Hawstone, Pa., Niles, Warren, Windham, O., Leslie, Md., Athens, Tex., $157; Morrisville, Latrobe, Pa., $160; Curtner, Calif., $182.

Semisilica Brick (per 1000)

Clearfield, Pa., $145; Woodbridge, N. J., $128; Philadelphia, $130.

Ladle Brick (per 1000)

Dry Pressed: Alsey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Vanport, Pa., Mexico, Vandalia, Mo., Wellsville, Irondale, New Salisbury, O., $96; Clearfield, Pa., Portsmouth, O., $98.

High-Alumina Brick (per 1000)

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $220; Danville, Ill., $223; Philadelphia, Clearfield, Pa., $230.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $275; Danville, Ill., $278; Philadelphia, Clearfield, Pa., $285.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $315; Danville, Ill., $318; Philadelphia, Clearfield, Pa., $325.

Sleeves (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., St. Louis, $177; Clearfield, Pa., $189.

Nozzles (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., St. Louis, $292; Clearfield, Pa., $311.

Runners (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., $221; Clearfield, Pa., $236.

Dolomite (per net ton)

Domestic, dead-burned, bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, O., Gibsonburg, Narlo, O., $16; Thornton, McCook, Ill., $16.35; Dolly Siding, Bonne Terre, Mo., $15.

Magnesite (per net ton)

Domestic, dead-burned, bulk ½-in. grains with fines: Chewelah, Wash., Luning, Nev. $43; ⅝-in. grains with fines: Baltimore, $69.40.

Fluorspar

Metallurgical grades, f.o.b. shipping point, in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $38-39; 70%, $35-36; 60%, $31-32. Imported, net tons, f.o.b. cars point of entry, duty paid, metallurgical grade: European, $34; Mexican, $26.50.

Ores

Lake Superior Iron Ore

(Prices effective for the 1956 shipping season, gross tons, 51.50% iron natural, rail of vessel, lower lake ports.)

Old range bessemer	$11.25
Old range nonbessemer	11.10
Mesabi bessemer	11.00
Mesabi nonbessemer	10.85
Open-hearth lump	12.10
High phos.	10.85

The foregoing prices are based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Dec. 1, 1955, and increases or decreases after such date are for seller's account.

Eastern Local Iron Ore

Cents per unit, deld. E. Pa.

Foundry and basic 52-62% concentrates contract	17.00-18.00

Foreign Iron Ore

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 65%	25.00
N. African hematite (spot)	nom. 24.00-25.00
Brazilian iron ore, 68-69%	33.00-34.00

Tungsten Ore

Net ton unit, before duty

Foreign, wolframite, good commercial quality	$28.50-29.00
Domestic, concentrates, mine	55.00

Manganese Ore

Mn 46-48%, Indian (export tax included), $1.60-1.70 per long ton unit, c.i.f. U.S. ports, duty for buyer's account; other than Indian, $1.45-1.50; contracts by negtiation.

Chrome Ore

Gross ton f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and Rhodesian

48% 3:1	$54.00-57.00
48% 2.8:1	51.00-54.00
48% no ratio	43.00-45.00

South African Transvaal

48% no ratio	$37.50-39.00
44% no ratio	26.00-27.00

Turkish

48% 3:1	$60.00-63.00

Domestic

Rail nearest seller

18% 3:1	$39.00

Molybdenum

Sulphide concentrate, per lb of Mo content, mines, unpacked $1.18

Antimony Ore

Per unit of Sb content, c.i.f. seaboard

55-60%	$3.35-3.80
60-65%	3.80-3.90

Vanadium Ore

Cents per lb V_2O_5

Domestic	31.00

Metal Powder

(Per pound f.o.b. shipping point in ton lots for minus 100 mesh, except as noted)

Sponge iron:	Cents
Swedish, c.i.f. Camden, N.J., c.l. in bags	8.50
Domestic:	
F.o.b., Johnstown, Pa., Niagara Falls, N. Y., in bags	9.50
F.o.b., Riverton, N. J., in bags	8.50
Canadian, f.o.b. shipping point	9.50
Electrolytic iron:	
Melting stock, 99.9% Fe, irregular fragments of ¼ in. x 1.3 in.	26.00
Annealed, 99.5% Fe.	36.50
Unannealed (99+ % Fe)	34.00
Unannealed (99+ % Fe) (minus 325 mesh)	59.00
Powder Flakes (minus 16, plus 100 mesh)	29.00
Carbonyl Iron:	
98.1-99.9%, 3 to 20 microns, depending on grade, 86.00-275.00, in standard 200-lb containers; all minus 200 mesh.	
Aluminum:	
Atomized, 500 lb, drum, frght allowed Carlots	36.20
Ton lots	*37.20*
Antimony, 500 lb lots	32.00*
Brass, 5000-lb lots	36.80-46.80†
Bronze, 5000-lb lots	56.20-60.00†
Copper:	
Electrolytic	14.25*
Reduced	14.25*
Lead	7.50*
Manganese:	
Minus 35 mesh	64.00
Minus 100 mesh	70.00
Minus 200 mesh	75.00
Nickel, unannealed	$1.05
Nickel-Silver, 5000-lb lots	*56.10-60.10†*
Phosphor-Copper, 5000-lb lots	66.00
Copper (atomized) 5000-lb lots	48.50-56.00‡
Silicon	47.50
Solder	7.00*
Stainless Steel, 304	$1.05
Stainless Steel, 316	$1.40
Tin	14.50*
Zinc, 5000-lb lots	19.75-33.00‡
Tungsten:	Dollars
Melting grade, 99%	
60 to 2000 mesh:	
1000 lb and over	4.20
Less than 1000 lb.	4.35
Chromium, electrolytic 99.8% Cr min. metallic basis	5.00

*Plus cost of metal. †Depending on composition. ‡Depending on mesh. §70% Cu, 20% Zn, 10% Ni. **64% Cu, 18% Zn, 18% Ni.

Electrodes

Threaded with nipple; unboxed, f.o.b. plant

GRAPHITE

Inches Diam.	Length	Per 100 lb
2	24	$57.75
2½	30	37.25
3	40	35.25
4	40	33.25
5¼	40	33.00
6	60	30.00
7	60	26.75
8, 9, 10	60	26.50
12	72	25.50
14	60	25.50
16	72	24.50
17	60	25.50
18	72	24.50
20	72	24.00
24	84	24.75

CARBON

8	60	13.30
10	60	13.00
12	60	12.95
14	60	12.85
14	72	11.95
17	60	11.85
17	72	11.40
20	84	11.40
20	90	11.00
24	72, 84	11.25
24	96	10.95
30	84	11.05
40, 35	110	10.70
40	100	10.70

ELECTRODES

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, furnace	$14.50-15.50
Connellsville, foundry	17.50-18.50

Oven Foundry Coke

Birmingham, ovens	$27.60
Cincinnati, deld.	32.53
Buffalo, ovens	29.50
Camden, N. J. ovens	29.50
Detroit, ovens	29.50
Pontiac, deld.	31.15
Saginaw, deld.	32.73
Erie, Pa., ovens	30.50
Everett, Mass., ovens	30.55*
New England, deld.	29.75
Indianapolis, ovens	28.00
Ironton, O., ovens	28.25
Cincinnati, deld.	30.00
Kearny, N.J., ovens	25.50
Lone Star, Tex., ovens	30.50
Milwaukee, ovens	30.50
Painesville, O., ovens	32.55
Cleveland, deld.	29.50
Philadelphia, ovens	31.50
St. Louis, ovens	28.25
Neville Island (Pittsburgh), Pa., ovens	29.75
St. Paul, ovens	33.14
Chicago, deld.	29.50
Swedeland, Pa., ovens	29.75
Terre Haute, Ind., ovens	

*Or within $4.55 freight zone from works.

Imported Steel

(Base per 100 lb, landed, duty paid, based on current ocean rates. Any increase in these rates is for buyer's account. Source of shipment: Western continental European countries)

	North Atlantic	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A 305	$7.15	$7.15	$7.15	$7.40
Bar Size Angles	7.11	7.11	7.11	7.26
Structural Angles	7.30	7.30	7.30	7.60
I-Beams	7.75	7.75	7.75	8.15
Plates (basic bessemer)	9.30	9.30	9.30	9.70
Sheets, H.R.	8.55	8.55	8.55	8.85
Sheets, C.R. (drawing quality)	8.95	8.95	8.95	9.35
Furring Channels, C.R., 1000 ft, ¾ x 0.30 lb per ft	27.17	27.17	27.17	27.64
Barbed Wire (†)	6.80	6.80	6.80	7.25
Merchant Bars	7.15	7.15	7.15	7.50
Hot-Rolled Bands	7.25	7.25	7.25	7.65
Wire Rods, Thomas Commercial No. 5	6.38	6.38	6.38	6.78
Wire Rods, O-H Cold Heading Quality No. 5	6.72	6.72	6.72	7.12
Bright Common Wire Nails (‡)	8.45	8.45	8.45	8.57
Oil Country Pipe: Mills withdrawn temporarily.				

†Per 82-lb. net, reel. ‡Per 100-lb kegs, 20d nails and heavier.

Coal Chemicals

Spot, cents per gallon, ovens

Pure benzene	36.00
Toluene, one deg.	32.00-34.00
Industrial xylene	32.00-35.00

Per ton, bulk, ovens

Ammonium sulfate	$32.00

Cents per pound, producing point

Phenol: Grade 1, 15.00; Grade 2-3, 14.50; Grade 4, 16.50; Grade 5, 15.25.

Ferroalloys

MANGANESE ALLOYS

Spiegeleisen: Carlot, per gross ton, Palmerton, Pa. 21-23% Mn, $105; 19-21% Mn, 1-3% Si. $102.50; 16-19% Mn, $100.50.

Standard Ferromanganese: (Mn 74-76%, C 7% approx). Base price per net ton; $255, Johnstown, Duquesne, Sheridan, Pa., Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. Add or subtract $2 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively.

(Mn 79-81%). Lump $263 per net ton, f.o.b. Anaconda or Great Falls, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%, fractions in proportion to nearest 0.1%.

Low-Carbon Ferromanganese, Regular Grade: (Mn 85-90%). Carload, lump, bulk, max, 0.07% C, 35.1c per lb of contained Mn, carload packed 36.4c, ton lots 37.9c, less ton 39.1c. Delivered. Deduct 1.5c for max 0.15% C grade from above prices, 3c for max 0.03% C, 3.5c for max 0.50% C, and 6.5c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk, 25.5c per lb of contained Mn, packed, carload 26.8c, ton lot 28.4c, less ton 29.6c. Delivered. Spot, add 0.25c.

Manganese Metal: 2" x D (Mn 95.5% min, Fe 2% max, Si 1% max, C 0.2% max). Carload, lump, bulk, 45c per lb of metal; packed, 45.75c; ton lot 47.25c; less ton lot 49.25c. Delivered. Spot, add 2c.

Electrolytic Manganese Metal: Min carload, 33c; 2000 lb to min carload, 35c; 500 lb to 1999 lb, 37c; 50 lb cans, add 0.5c per lb. Premium for hydrogen-removed metal, 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or to any point east of Mississippi; or f.o.b. Marietta, O., freight allowed.

Silicomanganese: (Mn 65-68%). Contract, lump, bulk 1.50% C grade, 18-20% Si, 13.8c per lb of alloy. Packed, c.l. 15c, ton 15.45c, less ton 16.45c, f.o.b. Alloy, W. Va., Ashtabula, O., Marietta, O., Sheffield, Ala., Portland, Oreg. For 2% C grade, Si 15-17%, deduct 0.2c from above prices. For 3% C grade, Si 12-14.5%, deduct 0.4c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 4% max, C 0.10% max). Contract, ton lot, 2" x D, $1.50 per lb of contained Ti; less ton $1.55. (Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lot $1.35, less ton $1.37, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis. Spot, add 5c.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract $200 per ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi river and north of Baltimore and St. Louis.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4.5%). Contract $225 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: Contract, c.l. lump, bulk, 27.75c per lb of contained Cr; c.l. packed 29.3c, ton lot 31.05c; less ton 32.45c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome: (Cr 67-71%). Contract, carload, lump, bulk, C 0.025% max (Simplex) 34.75c per lb contained Cr, 0.02% max 41.5c, 0.03% max 41c, 0.06% max 39.5c, 0.1% max 39c, 0.15% max 38.75c, 0.2% max 38.5c, 0.5% max 38.25c, 1.0% max 37.5c, 1.5% max 37.35c, 2.0% max 37.25c. Ton lot, add 3.4c, less ton add 5.1c. Carload packed add 1.75c. Delivered. Spot, add 0.25c.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7%, Si 7-10%). Contract, c.l., 2 in. x D, bulk 29.05c per lb contained Cr. Packed, c.l. 30.65c, ton 32.45c, less ton 33.95c. Delivered. Spot, add 0.25c.

Foundry Ferrosilicon Chrome: (Cr 50-54%, Si 28-32%, C 1.25% max). Contract, carload, packed, 8 M x D, 20.85c per lb of alloy, ton lot 22.10c; less ton lot 23.3c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome-Silicon: (Cr 39-41%, Si 42-49%, C 0.05% max). Contract, carload, lump, 4" x down and 2" x down, bulk, 41.35c per lb of contained Cr; 1" x down, bulk 42.35c. Delivered.

Chromium Metal, Electrolytic: Commercial grade (Cr 99.8% min, metallic basis, Fe 0.2% max). Contract, carlot, packed 2" x D plate (about ⅛" thick) $1.29 per lb, ton lot $1.31, less ton lot $1.33. Delivered. Spot, add 5c.

VANADIUM ALLOYS

Ferrovanadium: Open-hearth Grade (V 50-55%, Si 8% max, C 3% max). Contract, any quantity, $3.20 per lb of contained V. Delivered. Spot, add 10c. **Special Grade:** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.30. **High Speed Grade:** (V 50-55%, or 70-75%, Si 1.50% max, C 0.20% max) $3.40.

Grainal: Vanadium Grainal No. 1, $1.05 per lb; No. 6, 68c; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract, less carload lot, packed, $1.38 per lb contained V_2O_5, freight allowed. Spot, add 5c.

SILICON ALLOYS

25-30% Ferrosilicon: Contract, carload, lump, bulk, 20.0c per lb of contained Si. Packed 21.40c; ton lot 22.50c, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

50% Ferrosilicon: Contract, carload, lump, bulk, 13.9c per lb of contained Si. Packed c.l. 16.4c, ton lot 17.85c, less ton 19.5c, f.o.b. Alloy, W. Va., Ashtabula, Marietta, O., Sheffield, Ala., and Portland, Oreg. Spot, add 0.45c.

Low Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.45c to 50% ferrosilicon prices.

65% Ferrosilicon: Contract, carload, lump, bulk, 15.25c per pound contained silicon. Packed, c.l. 17.25c, ton lot, 19.05c; less ton 20.4c. Delivered. Spot, add 0.35c.

75% Ferrosilicon: Contract, carload, lump, bulk, 16.4c per lb of contained Si. Packed, c.l. 18.30c, ton lot 19.95c, less ton 21.2c. Delivered. Spot, add 0.3c.

90% Ferrosilicon: Contract, carload, lump, bulk, 19.5c per lb of contained Si. Packed, c.l. 21.15c, ton lot 22.55c, less ton 23.6c. Delivered. Spot, add 0.25c.

Silicon Metal: (98% min Si, 0.75% max Fe, 0.07% max Ca). C.l. lump, bulk, 21.5c per lb of Si. Packed, c.l. 23.15c, ton lot 24.45c, less ton 25.45c. Add 0.5c for max 0.03% Ca grade. Deduct 0.5c for max 2% Fe grade analyzing min 96.5% Si. Spot, add 0.25c.

Alsifer: (Approx 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 10.65c per lb of alloy, ton lot, packed, 11.8c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, C 0.20% max). Contract, c.l. lump, bulk 9.25c per lb of alloy. Packed, c.l. 10.45c, ton lot 11.6c, less ton 12.45c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Contract, carload, lump, packed 27.25c per lb of alloy, ton lot 28.4c, less ton 29.65c. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy; less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices, 100 lb and over, are as follows: Grade A (10-14% B) 85c per lb; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si). Carload, bulk, lump or 3" x D, $5.25 per lb of contained B. Packed, carload $5.40, ton to c.l. $5.50, less ton $5.60. Delivered.

Bortam: (B 1.5%-1.9%). Ton lot, 45c per lb; less than ton lot, 50c per lb.

Carbortam: (B 1 to 2%). Contract, lump, carload 9.50c per lb, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Contract, carload, lump, bulk 23c per lb of alloy, carload packed 24.25c, ton lot 26.15c, less ton 27.15c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.5-3%). Contract, carload, lump, bulk 24c per lb of alloy, carload packed 25.65c, ton lot 27.95c, less ton 29.45c. Delivered. Spot, add 0.25c.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx. 3¾ lb each and containing 2 lb of Cr). Contract, carload, bulk, 19c per lb of briquet, carload packed in box pallets 19.2c, in bags 20.1c; 3000 lb to c.l. in box pallets 20.4c; 2000 lb to c.l. in bags, 21.3c; less than 2000 lb in bags 22.2c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx 3 lb and containing 2 lb of Mn). Contract, carload, bulk 14.8c per lb of briquet; c.l., packed, pallets 15c, bags 16c; 3000 lb to c.l., pallets 16.2c; 2000 lb to c.l. bags, 17.2c, less ton 18.1c. Delivered. Add 0.25 for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx 3½ lb and containing 2 lb of Mn and approx ½ lb of Si). Contract, c.l. bulk 15.1c per lb of briquet; c.l. packed, pallets, 15.3c; bags 16.3c. 3000 lb to c.l., pallets, 16.5c; 2000 lb to c.l., bags 17.5c; less ton 18.4c. Delivered. Add 0.25c for notching. Spot, add 00.25c.

Silicon Briquets: (Large size—weighing approx. 5 lb and containing 2 lb of Si). Contract, carload, bulk, 7.7c per lb of briquet, packed, pallets, 7.9c; bags 8.9c; 3000 lb to c.l., pallets 9.5c; 2000 lb to c.l. bags 10.5c; less ton 11.4c Delivered. Spot, add 0.25c. (Small size—weighing approx. 2½ lb and containing 1 lb of Si). Carload, bulk 7.85c. Packed, pallets 8.05c; bags 9.05c; 3000 lb to c.l. pallets 9.65c; 2000 lb to c.l. bags 10.65c; less ton 11.55c. Delivered. Add 0.25c for notching, small size only. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each). $1.41 per pound of Mo contained, f.o.b. Langeloth, Pa.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%). 5000 lb W or more $3.15 per lb of contained W; 2000 lb W to 5000 lb W, $3.25; less than 2000 lb W, $3.37. Delivered.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Si 8% max, C 0.4% max). Contract, ton lot, 2" x D, $6.90 per lb of contained Cb. Delivered. Spot, add 10c.

Ferrotantalum—Columbium: (Cb 40% approx., Ta 20% approx., and Cb plus Ta 60% min, C 0.30% max). Ton lot 2" x D, $4.95 per lb of contained Cb plus Ta, delivered; less ton lot $5.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx.). Contract, c.l. packed ½-in. x 12 M 19c per lb of alloy, ton lot 20.15c, less ton 21.4c. Delivered. Spot, add 0.25c.

Graphidox No. 5: (Si 48-52%, Ca 5.7%, Ti 9-11%). C.l. packed, 19c per lb of alloy, ton lot 20.15c; less ton lot 21.4c, f.o.b. Niagara Falls, N. Y.; freight allowed to St. Louis.

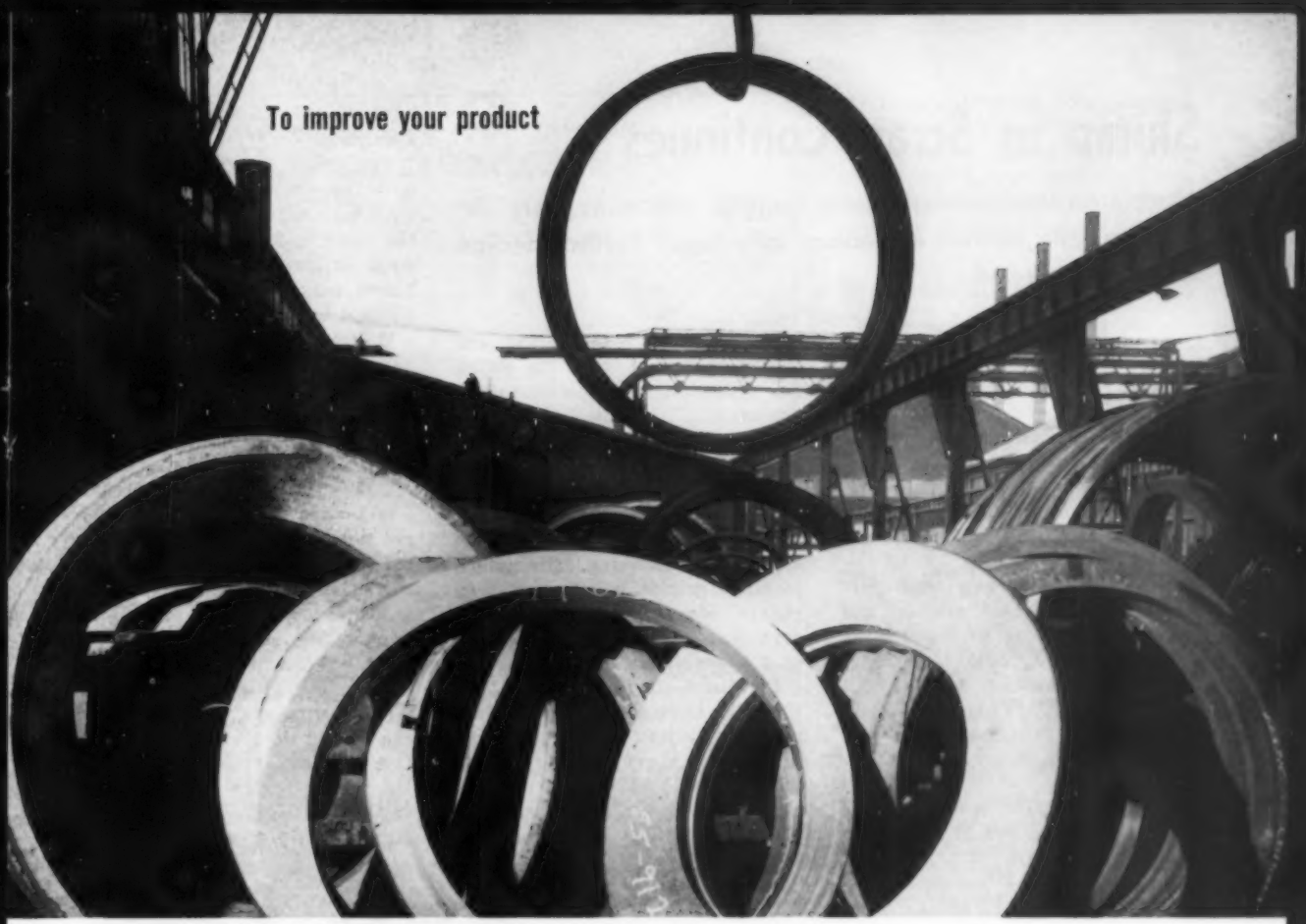
V-3 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 18.1c per lb of alloy; ton lot 19.55c; less ton lot 20.8c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Simanal: (Approx. 20% each Si, Mn, Al; bal. Fe). Lump, carload, bulk 18.50c. Packed c.l. 19.50c, 2000 lb to c.l. 20.50c, less than 2000 lb 21c per lb of alloy. Delivered.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $4 for each 1% of P above or below the base); carload, f.o.b. sellers' works. Mt. Pleasant, Siglo, Tenn., $90 per gross ton.

Ferromolybdenum: (55-75%). Per lb contained Mo, in 200-lb container, f.o.b. Langeloth and Washington, Pa., $1.68 in all sizes except powdered which is $1.74.

Technical Molybdic-Oxide: Per lb contained Mo, in cans, $1.39; in bags, $1.33, f.o.b. Langeloth and Washington, Pa.



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ALCO circular forgings are available from 18- to 145-in. OD. You can get complete information from the nearest ALCO sales office, or write Spring & Forge Division, Dept. OCF-2, P. O. Box 1065, Schenectady 1, N. Y. for brochures.

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Slump in Scrap Continues

Market on steelmaking grades sluggish with consumers displaying little interest in dealers' offerings. Further decline in prices expected

Scrap Prices, Page 150

Philadelphia—Scrap is steady. Except for a nominal decline of $1 on mixed borings and turnings to $44, delivered, prices on the steel and cast grades are unchanged.

Two cargoes of steel scrap, 15,000 tons, are being loaded here for export.

Pittsburgh—No new mill purchases are reported. Brokers are able to buy some grades for $1 less than they could last week. No. 1 heavy melting scrap, No. 1 bundles, punchings and plate scrap and electric furnace bundles are the grades which continue to decline.

Boston — No. 2 heavy melting scrap grades are off $1 a ton, but prices being paid for export and district shipment tend to soften the reduction in the steelmaking grades.

New York — Brokers' buying prices are unchanged. Consumer pressure is off, but collections of yard scrap are slow.

Chicago—Prices are off $1 to $5 on the steelmaking, railroad and foundry grades on limited purchases. Market softness of the last several weeks may be prophetic of a lower steelmaking rate.

Cleveland—In the absence of active mill buying, scrap prices are unchanged and largely nominal, with No. 1 heavy melting at $60-$61 here, and $63-$64 in the Valley. The tone of the market is soft. Collections and processing have been hampered by the weather.

The prices currently quoted are not firm, being largely nominal with sales absent. Brokers think the next sale will bring prices down to around $56-$57 on No. 1 heavy melting at Cleveland, and $59-$60 in the Valley.

Buffalo—Local scrap dealers are delivering on old orders at prevailing prices, but the tone of the market is soft. There is general agreement that prices will be down when February business is placed —how much is anyone's guess.

Youngstown—Local steelmakers are not buying scrap, contributing further to the easiness evident in the market in recent weeks.

There are no large inventories here, either at the mills or scrap yards.

Detroit—The scrap market here is easy. Brokers say sales are at the lowest level in over a year. One automobile builder sold 40 carloads of clippings for $49.

Cincinnati—The price of scrap slipped $1 a ton last week. No mill

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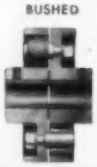

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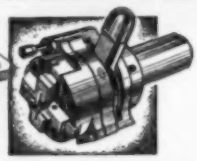

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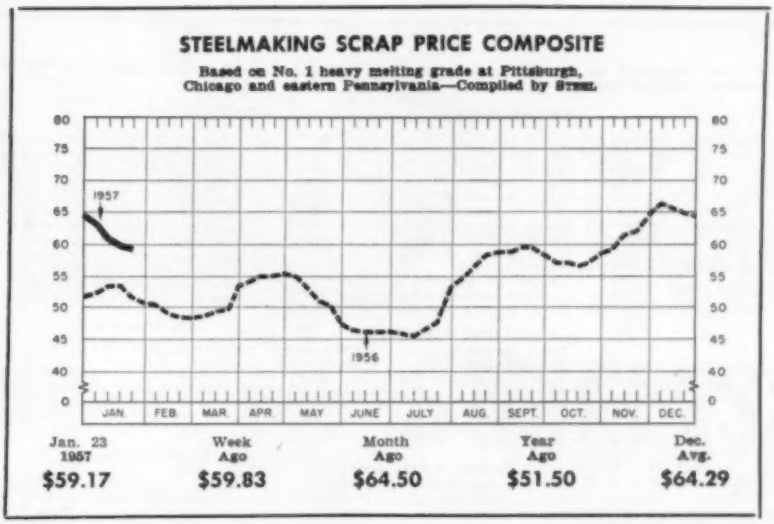

buying has been done since early in the month. Brokers' buying price for No. 1 heavy melting is $58-$59, the lowest since October.

Birmingham — Steel scrap is weak. A few mills are buying at nominal prices, and exporters at most ports are out of the market. Some exporters have held up orders placed earlier for January and early February shipment.

St. Louis — Scrap prices last week suffered their sharpest drop in six months. The break was most severe in the railroad grades, which fell $10 to $13.50 a ton.

All prices on the steel grades are off $2 a ton, including heavy melting, bundles, busheling and turnings. The cuts in cast grades ranged from $1 to $2.

Seattle—Scrap is unchanged and firm. Sales are active, both domestic and offshore demand being well maintained. The favorable weather has permitted steady shipments from the interior.

Trans-Pacific charters for scrap, consigned to Japan, have recorded new highs. From the Pacific Coast the market has reached $225,000, while from North Atlantic and Gulf ports charters have attained a level of $342,500, free load and discharge.

San Francisco—Prices on steel scrap are holding, but the market undertone is weaker despite heavy exports, estimated at 40,000 tons from this port during the current month.

Los Angeles—The scrap market is steady following early January price fluctuations. Demand for the steelmaking grades is less than expected.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 137

Seasonal sluggishness in building operations is reflected in a slight slackening in pressure for reinforcing bars at some market centers. Since contractors have a heavy volume of work on their boards for spring release, ordering is expected to spurt within the next few weeks.

Structural Shapes . . .

Structural Shape Prices, Page 137

Structural steel awards are relatively light, but considerable work is before the market. Much bridge tonnage is being figured. Numerous public buildings, such as schools, also are up for figures. A number of large office buildings are pending.

Highway work is prominent. Over 12,000 tons of Pennsylvania state work in Allegheny county has been placed, with 4250 tons of tunnel construction there up for bidding on Mar. 1.

There are slight signs of supply improvement in standard structurals, light angles and channels in New England.

Recent increases in extras raise plain material costs to fabricators

(*Please turn to page* 155)

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Iron and Steel Scrap

Consumer prices, per gross ton, except as otherwise noted, including broker's commission, as reported to STEEL. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

Jan. 23	$59.17
Jan. 16	59.83
Dec. Avg.	64.29
Jan. 1956	52.17
Jan. 1952	43.00

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	*61.00-62.00*
No. 2 heavy melting	55.00-56.00
No. 1 bundles	*61.00-62.00*
No. 2 bundles	49.00-50.00
No. 1 busheling	*61.00-62.00*
Machine shop turnings	41.00-42.00
Mixed borings, turnings	41.00-42.00
Short shovel turnings	46.00-47.00
Cast iron borings	46.00-47.00
Cut structurals, 3 ft. lengths	*68.00-69.00*
Heavy turnings	57.00-58.00
Punchings & plate scrap	*68.00-69.00*
Electric furnace bundles	*68.00-69.00*

Cast Iron Grades

No. 1 cupola	53.00-54.00
Heavy breakable cast	50.00-51.00
Unstripped motor blocks	40.00-41.00
No. 1 machinery cast	60.00-61.00

Railroad Scrap

No. 1 R.R. heavy melt	64.00-65.00
Rails, 2 ft and under	79.00-80.00
Rails, 18 in. and under	80.00-81.00
Rails, random lengths	77.00-78.00
Railroad specialties	71.00-72.00

Stainless Steel Scrap

18-8 bundles & solids	480.00-520.00
18-8 turnings	400.00-420.00
430 bundles & solids	110.00-120.00
430- turnings	80.00-85.00

CLEVELAND

No. 1 heavy melting	60.00-61.00
No. 2 heavy melting	51.00-52.00
No. 1 bundles	60.00-61.00
No. 2 bundles	44.00-45.00
No. 1 busheling	60.00-61.00
Machine shop turnings	35.00-36.00
Mixed borings, turnings	38.00-39.00
Short shovel turnings	38.00-39.00
Cast iron borings	38.00-39.00
Cut foundry steel	58.00-59.00
Low phos.	64.00-65.00
Cut structural plates 2 ft and under	67.00-68.00
Alloy free, short shovel turnings	43.00-44.00
Electric furnace bundles	61.00-62.00

Cast Iron Grades

No. 1 cupola	57.00-58.00
Charging box cast	49.00-50.00
Heavy breakable cast	47.00-48.00
Stove plate	53.00-54.00
Unstripped motor blocks	38.00-39.00
Brake shoes	47.00-48.00
Clean auto cast	55.00-56.00
Burnt cast	44.00-45.00
Drop broken machinery	59.00-60.00

Railroad Scrap

No. 1 R.R. heavy melt	64.00-65.00
R.R. malleable	66.00-67.00
Rails, 2 ft and under	81.00-82.00
Rails, 18 in. and under	82.00-83.00
Rails, random lengths	76.00-77.00
Cast steel	69.00-70.00
Railroad specialties	72.00-73.00
Uncut tires	71.00-72.00
Angles, splice bars	72.00-73.00
Rails, rerolling	83.00-84.00

Stainless Steel

(Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	450.00-500.00
18-8 turnings	300.00-310.00
430 clips, bundles, solids	110.00-115.00
430 turnings	55.00-60.00

YOUNGSTOWN

No. 1 heavy melting	63.00-64.00
No. 2 heavy melting	55.00-56.00
No. 1 bundles	63.00-64.00
No. 2 bundles	47.00-48.00
No. 1 busheling	63.00-64.00
Machine shop turnings	36.00-37.00
Short shovel turnings	43.00-44.00
Cast iron borings	43.00-44.00
Low phos.	67.00-68.00
Electric furnace bundles	64.00-65.00

Railroad Scrap

No. 1 R.R. heavy melt.	65.00-66.00

CHICAGO

No. 1 heavy melting	*55.00-59.00*
No. 2 heavy melting	*45.00-46.00*
No. 1 factory bundles	*60.00-61.00*
No. 1 dealer bundles	*54.00-55.00*
No. 2 bundles	*43.00-44.00*
No. 1 busheling	*55.00-59.00*
Machine shop turnings	37.00-38.00
Mixed borings, turnings	39.00-40.00
Short shovel turnings	39.00-40.00
Cast iron borings	39.00-40.00
Cut structurals, 3 ft	*61.00-62.00*
Punchings & plate scrap	*62.00-63.00*

Cast Iron Grades

No. 1 cupola	*48.00-49.00*
Stove plate	*44.00-45.00*
Unstripped motor blocks	*36.00-37.00*
Clean auto cast	*53.00-54.00*
Drop broken machinery	*53.00-54.00*

Railroad Scrap

No. 1 R.R. heavy melt	*60.00-61.00*
R.R. malleable	*62.00-63.00*
Rails, 2 ft and under	*76.00-77.00*
Rails, 18 in. and under	*77.00-78.00*
Angles, splice bars	*65.00-66.00*
Rails, rerolling	*72.00-73.00*

Stainless Steel Scrap

18-8 bundles & solids	*510.00-525.00*
18-8 turnings	355.00-375.00
430 bundles & solids	105.00-110.00
430 turnings	*65.00-70.00*

DETROIT

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*49.00-50.00*
No. 2 heavy melting	*42.00-43.00*
No. 1 bundles	*50.00-51.00*
No. 2 bundles	*49.00-50.00*
No. 1 busheling	*49.00-50.00*
Machine shop turnings	29.00-30.00
Mixed borings, turnings	*30.00-31.00*
Short shovel turnings	*31.00-32.00*
Punchings & plate scrap	63.00-64.00

Cast Iron Grades

No. 1 cupola	51.00
Charging box cast	44.00
Stove plate	45.00
Heavy breakable	44.00
Unstripped motor blocks	32.00
Clean auto cast	55.00
Malleable	56.00

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	*49.00*
No. 2 heavy melting	*46.00*
No. 1 bundles	*49.00*
No. 2 bundles	*40.50*
No. 1 busheling	*49.00*
Machine shop turnings	*36.00†*
Short shovel turnings	*39.00†*

Cast Iron Grades

No. 1 cupola	48.00
Charging box cast	*43.00*
Heavy breakable cast	*42.50*
Unstripped motor blocks	42.50
Brake shoes	51.00
Clean auto cast	*50.50*
Stove plate	*41.00*

Railroad Scrap

No. 1 R.R. heavy melt.	*56.00*
Rails, 18 in. and under	*79.00*
Rails, rerolling	*76.00*
Rails, random lengths	*65.00*
Angles, splice bars	*69.00*

†Nominal

PHILADELPHIA

No. 1 heavy melting	59.00
No. 2 heavy melting	51.00
No. 1 bundles	59.00
No. 2 bundles	49.00
No. 1 busheling	59.00
Electric furnace bundles	63.00
Mixed borings, turnings	*44.00*
Machine shop turnings	43.00
Short shovel turnings	47.00
Heavy turnings	55.00
Structurals & plates	64.00-66.00
Couplers, springs, wheels	73.00
Rails, crops, 2 ft & under	80.00-82.00

Cast Iron Grades

No. 1 cupola	54.00-56.00
Malleable	67.00-68.00†
Heavy breakable cast	59.00
Drop broken machinery	60.00-61.00

†Nominal.

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting	55.00-56.00
No. 2 heavy melting	47.00-48.00
No. 1 bundles	55.00-56.00
No. 2 bundles	45.00-46.00
Machine shop turning	35.00-35.50
Mixed borings, turning	36.00-37.00
Short shovel turnings	39.00-40.00
Low phos. (structural & plate)	58.00-59.00

Cast Iron Grades

No. 1 cupola	46.00-47.00
Unstripped motor blocks	39.00-40.00
Heavy breakable	50.50-51.50

Stainless Steel

18-8 sheets, clips, solids	475.00-485.00
18-8 borings, turnings	345.00-370.00
430 sheets, clips, solids	110.00-115.00
410 sheets, clips, solids	100.00-105.00

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	50.00-51.50
No. 2 heavy melting	*40.00-41.00*
No. 1 bundles	50.00-51.50
No. 2 bundles	*39.00-39.50*
No. 1 busheling	*50.00-51.00*
Machine shop turnings	32.00-33.00
Mixed borings, turnings	*33.00-33.50*
Short shovel turnings	36.50-37.00
No. 1 cast	44.50-45.50
Mixed cupola cast	42.00-43.00
No. 1 machinery cast	45.00-46.00

BUFFALO

No. 1 heavy melting	61.00-62.00
No. 2 heavy melting	52.00-53.00
No. 1 bundles	61.00-62.00
No. 2 bundles	48.00-49.00
No. 1 busheling	61.00-62.00
Mixed borings, turnings	38.00-39.00
Machine shop turnings	39.00-40.00
Short shovel turnings	43.00-44.00
Cast iron borings	34.00-35.00
Low phos.	65.00-66.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	49.00-50.00
No. 1 machinery	54.00-55.00

Railroad Scrap

Rails, random lengths	69.00-70.00
Rails, 3 ft and under	75.00-76.00
Railroad specialties	68.00-69.00

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*58.00-59.00*
No. 2 heavy melting	*48.00-49.00*
No. 1 bundles	*58.00-59.00*
No. 2 bundles	*42.00-43.00*
No. 1 busheling	*58.00-59.00*
Machine shop turnings	*39.00-40.00*
Mixed borings, turnings	*37.00-38.00*
Short shovel turnings	*42.00-43.00*
Cast iron borings	*37.00-38.00*
Low phos. 18 in.	*64.00-65.00*

Cast Iron Grades

No. 1 cupola	47.00-48.00
Heavy breakable cast	46.00-47.00
Charging box cast	47.00-48.00
Drop broken machinery	57.00-58.00

Railroad Scrap

No. 1 R.R. heavy melt.	*59.00-60.00*
Rails, 18 in. and under	*78.00-79.00*
Rails, random lengths	*70.00-71.00*

BIRMINGHAM

No. 1 heavy melting	46.00-47.00
No. 2 heavy melting	44.00-45.00
No. 1 bundles	46.00-47.00
No. 2 bundles	38.00-39.00
No. 1 busheling	46.00-47.00
Cast iron borings	27.00-28.00
Short shovel turnings	38.00-39.00
Machine shop turings.	37.00-38.00
Bar crops and plate	*61.00-62.00*
Structural & plate, 2 ft	60.00-61.00
Electric furnace bundles	54.00-55.00
Cut foundry steel	52.00-53.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	53.00-54.00
Stove plate	51.00-52.00
Unstripped motor blocks	44.00-45.00
Charging box cast	40.00-41.00
No. 1 wheels	45.00-46.00

Railroad Scrap

No. 1 R.R. heavy melt.	61.00-62.00
Rails, 18-in. and under	74.00-75.00
Rails, rerolling	*74.00-75.00*
Rails, random lengths	68.00-69.00
Angles, splice bars	66.00-67.00

SEATTLE

No. 1 heavy melting	56.00
No. 2 heavy melting	53.00
No. 1 bundles	53.00
No. 2 bundles	33.00-35.00
Machine shop turnings	30.00-33.00
Mixed borings, turnings	30.00-33.00
Electric furnace No. 1	62.00-65.00

Cast Iron Grades

No. 1 cupola	54.00-56.00
Heavy breakable cast	48.00-50.00
Unstripped motor blocks	48.00-49.00
Stove plate (f.o.b. plant)	42.00-43.00

LOS ANGELES

No. 1 heavy melting	54.00
No. 2 heavy melting	52.00
No. 1 bundles	53.00
No. 2 bundles	40.00
Machine shop turnings	32.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	58.00

SAN FRANCISCO

No. 1 heavy melting	59.00
No. 2 heavy melting	57.00
No. 1 bundles	58.00
No. 2 bundles	44.00
Machine shop turnings	38.00
Mixed borings, turnings	38.00
Cast iron borings	38.00
Heavy turnings	38.00
Short shovel turnings	40.00
Cut structurals	63.00

Cast Iron Grades

No. 1 cupola	60.00
Charging box cast	47.00-49.00
Stove plate	48.00
Heavy breakable cast	42.00
Unstripped motor blocks	50.00
Clean auto cast	60.00
No. 1 wheels	50.00
Drop broken machinery	62.00

HAMILTON, ONT.

No. 1 heavy melting	54.00
No. 2 heavy melting	47.00
No. 1 bundles	54.00
No. 2 bundles	40.50
Mixed steel scrap	46.00
Busheling, new factory: Prepared	52.00
Unprepared	48.00
Short steel turnings	35.00

Cast Iron Grades†

No. 1 machinery cast	58.00

†F.o.b., Hamilton, Ont.

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BUFFALO, N. Y. — HOUSTON, TEXAS — PITTSBURGH, PENNA. — SAN FRANCISCO, CAL.
CHICAGO, ILLINOIS — LEBANON, PENNA. — PUEBLO, COLORADO — SEATTLE, WASH.
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IMPORT & EXPORT — **LIVINGSTON & SOUTHARD, INC.,** 99 Park Ave., New York, N. Y. • *Cable Address:* **FORENTRACO**

Competitive Pressure Builds

Some nonferrous prices are being shaded for large tonnage orders. Aluminum mills are going all out for business. The result: You hear reports of price cutting

Nonferrous Metal Prices, Pages 154 & 155

JANUARY sales are slow. Competition is more intense.

Aluminum — Price cutting is under way. "Please-do-not-quote" sources reveal that at least one major mill is offering extrusions (it will produce any type it has the necessary dies for) at about 40 cents a pound if the customer will contract for a minimum of 45 tons. For a 90-ton extrusion order, the mill will shade its price to 39.50 cents a pound. The normal price is 45 to 50 cents a pound.

Another sign of stiffening competition: Independent fabricators are beginning to purchase more Belgian and German aluminum sheets. They are being offered at eastern docks for about 2 cents a pound less than the current domestic quotation. The ingot price (27.10 cents a pound) is being cut in some instances by as much as 1.50 cents a pound.

Outlook: The price cutting is temporary. An influx of orders from the automotive industry would cure most mill problems.

Zinc—Sales are fair to satisfactory. The government continues to add stability to the market through its purchases for strategic stockpile. Most producers are disappointed about automotive orders. States one zinc sales manager: "Detroit is still ordering materials on about a 30 to 45-day lead time. In years past, they have ordered for March and April by the end of January." Note of optimism: With Detroit playing its purchasing cards close to its vest, it may be that autodom is planning a longer production cycle which would bring 1957 year-end purchase totals up to expectation.

Zinc for galvanizing is helping to create a stable market at the 13.50 cent a pound level. But warehouse sales of galvanized sheets are being affected by the introduction of more continuous galvanizing lines. Reason: Rejects from the lines, which have only minor imperfections, are being sold at a reduced price to many customers who normally turn to warehouses for galvanized sheets.

Lead — Day-by-day results show some gain, but January will not be any more than a routine month for this metal. Sales are running about even with January, 1956, totals.

Copper — Thanks to a strong first half, Free World copper deliveries to fabricators reached 2.83 million tons last year, reports the Copper Institute. During 1955, 2.74 million tons were shipped. U.S. shipments to fabricators reached 1.47 million tons, an increase of 19,545 tons over 1955 results. Free World refined production reached 2.99 million tons last year. During 1955, 2.73 million tons were produced. U.S. refined totals: 1956, 1.58 million tons; 1955, 1.47 million tons. Free World copper capacity, says the Copper & Brass Research Association, for 1957 is about 3.5 million tons. Appraisal: 1. Wire and cable sales are still strong. 2. Brass mills are still waiting impatiently for word from Detroit. 3. Supply should be equal to or in excess of demand throughout the year if foreign mines do not develop labor trouble. 4. The London Metal Exchange quotations continue to be suppressed, hovering at slightly above the 33 cent a pound mark. 5. Foreign demand for copper from American sources is holding at better levels than domestic demand.

Magnesium — Primary domestic production reached 68,347 tons in 1956. December total: 7085 tons. This was the highest production for a single month since May, 1953.

Market Memos

- The International Nickel Co.'s rolling mill at Huntington, W. Va., has been shut down since Jan. 13 due to strike. U.S. conciliators met with company and union representatives last week. All deliveries of mill products have been suspended.
- The domestic tin market is quiet. Due to a strike at one Malayan smelter and the threatened dock walkout on the East Coast, tin is holding at about the 102.50 cent a pound market.

NONFERROUS PRICE RECORD

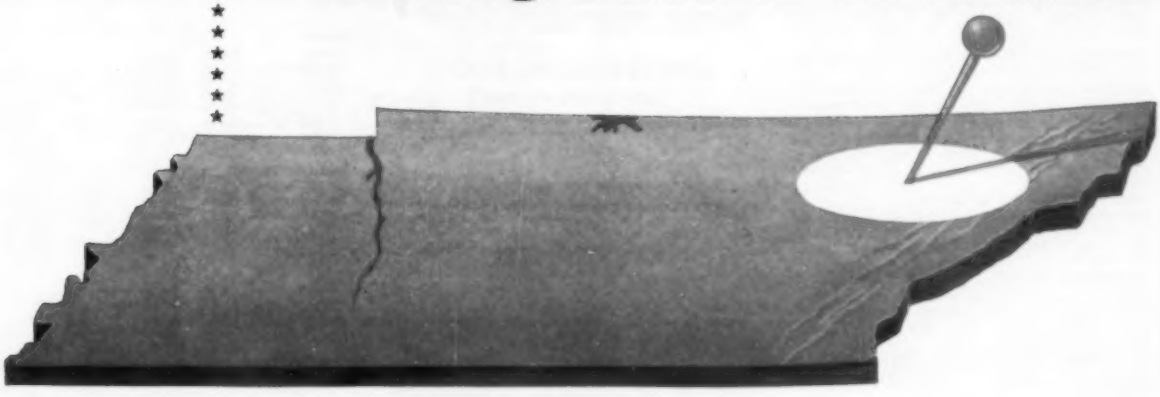
	Price Jan. 23	Last Change	Previous Price	Dec. Avg.	Nov. Avg.	Jan., 1956 Avg.
Aluminum ..	27.10	Aug. 10, 1956	25.90	27.100	27.100	24.400
Copper	35.00-36.00	Dec. 19, 1956	35.50-36.00	35.650	35.956	46.700
Lead	15.80	Jan. 13, 1956	16.30	15.800	15.800	15.960
Magnesium .	35.25	Aug. 13, 1956	33.75	35.250	35.250	32.500
Nickel	74.00	Dec. 6, 1956	64.50	70.880	64.500	64.500
Tin	102.625	Jan. 21, 1957	102.50	104.465	111.049	105.067
Zinc	13.50	Jan. 6, 1956	13.50	13.500	13.500	13.440

Quotations in cents per pound based on: COPPER, deld. Conn. Valley; LEAD, common grade, deld. St. Louis; ZINC, prime western, E. St. Louis; TIN, Straits, deld. New York; NICKEL, electrolytic cathodes, 99.9%, base size at refinery, unpacked; ALUMINUM, primary ingots, 99 + %, deld.; MAGNESIUM, pig, 99.8%, Velasco, Tex.

We've discovered

PART OF AMERICA'S FUTURE

underground in Tennessee



As the American economy has expanded, the use of zinc by industry has greatly accelerated, until today's per capita consumption of zinc shows a giant 24% increase over the per capita consumption only seven years ago.

But what about the future? With zinc's importance to Industry's ever-increasing demands, what about the supply?

In recent months, American Zinc has discovered a part of America's industrial future... underground in Tennessee. In the East Tennessee area, mining properties which adjoin American Zinc's long-established Mascot, Tenn., mining operations, exploration and development have confirmed zinc ore reserves underground which are equivalent to *more than 75 years' production at the current rate* of mines now operating in this area.

Tomorrow's zinc for automobile grills and trim... the galvanized coatings for steel... zinc for die-castings and brass... zinc pigments for paints and rubber... now lies underground in American Zinc's Tennessee development.

American Zinc, lead & smelting company

Columbus, Ohio · Chicago · St. Louis · New York · Detroit · Pittsburgh

Nonferrous Metals

Cents per pound, carlots except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99+%, ingots 27.10; pigs, 25.00, 10,000 lb or more, f.o.b. shipping point. Freight allowed on 500 lb or more.

Aluminum Alloy: No. 13, 28.90; No. 43, 28.70; No. 195, 30.30; No. 13, 28.90; No. 43, 28.70; 30-lb ingots.

Antimony: R.M.M. brand, 99.5%, 33.00; Lone Star brand, 33.50, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 27.50-28.00, New York, duty paid, 10,000 lb or more.

Beryllium: 97%, lump or beads, $71.50 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $74.75 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.

Beryllium Copper: 3.75-4.25% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. shipping point.

Bismuth: $2.25 per lb ton lots.

Cadmium: Sticks and bars, $1.70 per lb deld. **Cobalt:** 97-99%, $2.60 per lb for 550-lb keg; $2.62 per lb for 100-lb case; $2.67 per lb under 100 lb.

Columbium: Powder, $119.20 per lb, nom.

Copper: Electrolytic, 36.00 deld. Conn. valley; 36.00 deld. Midwest; custom smelters, 35.00 deld.; lake, 36.00 deld.; fire refined, 35.75 deld.

Germanium: First reduction, $201.85-$220 per lb; intrinsic grade, $220-$242.67 per lb, depending on quantity.

Gold: U.S. Treasury, $35 per oz.
Indium: 99.9%, $2.25 per troy oz.
Iridium: $90-$110 nom. per troy oz.
Lead: Common, 15.80; chemical, 15.90; corroding, 15.90, St. Louis. New York basis, add 0.20.

Lithium: 98+%, cups or ingots, $11.50; rod, $13.50; shot or wire, $14.50, f.o.b. Minneapolis, 100 lb lots.

Magnesium: Pig, 35.25; ingot, 36.00, f.o.b. Velasco, Tex. 13 in. sticks, 59.00, f.o.b. Madison, Ill.

Magnesium Alloys: AZ91B (diecasting), 37.25 deld.; AZ63A, AZ92A, AZ91C (sand casting), 40.75, f.o.b. Velasco, Tex.

Mercury: Open market, spot, New York, $255-$257 per 76-lb flask.

Molybdenum: Extruded ingot, $9.60 per pound, f.o.b. Detroit.

Nickel: Electrolytic cathodes, sheets (4 x 4 in. and larger), unpacked, 74.00; 10-lb pigs, unpacked, 78.25; "XX" nickel shot, 79.50; "F" nickel shot or ingots for addition to cast iron, 74.50; prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 1.01.

Osmium: $80-$100 per troy oz, nom.

Palladium: $23-$24 per troy oz.

Platinum: $98-$101 per troy oz from refineries.

Radium: $16-$21.50 per mg radium content, depending on quantity.

Rhodium: $115-$125 per troy oz.

Ruthenium: $45-$55 per troy oz.

Selenium: 99.5%, $13.50-$15.50 per lb.

Silver: Open market, 91.375 per troy oz.

Sodium: 16.50, c.l.; 17.00, l.c.l.

Tantalum: Sheet, rod, $68.70 per lb; powder, $56.63 per lb.

Tellurium: $1.50-$1.75 per lb.

Thallium: $12.50 per lb.

Tin: Straits, N.Y., spot, 102.625; prompt, 102.50.

Titanium: Sponge, 99.3+%, grade A-1 ductile (0.3% Fe max), $2.75; grade A-2 (0.5% Fe max), $2.50 per pound.

Tungsten: Powder, 98.8%, carbon reduced, 1000-lb lots, $4.20 per lb, nom, f.o.b. shipping point; less than 1000 lb, add 15.00; 99+% hydrogen reduced, $5. Treated ingot, $6.70.

Zinc: Prime Western, 13.50; brass special, 13.75; intermediate, 14.00, East St. Louis, freight allowed over 0.50 per pound. New York basis, add 0.50. High grade, 14.85; special high grade, 15.25 deld. Die casting alloy ingot No. 3, 18.00; No. 2, 19.00; No. 5, 18.50 deld.

Zirconium: Ingots, commercial grade, $14.40 per lb; low-hafnium reactor grade, $23.07. Sponge, commercial grade, $10 per lb; reactor grade, $14-$22 per lb, depending on quantity. Powder electronics grades, $15 per lb; flash grade, $11.50.

(Note: Chromium, manganese and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 24.25-26.00; No. 12 foundry alloy (No. 2 grade), 23.00-23.50; 5% silicon alloy, 0.60 Cu max, 24.75-26.25; 13 alloy, 0.60 Cu max, 24.75-26.25; 195 alloy, 23.00-26.50; 108 alloy, 23.00-23.50. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 23.50; grade 2, 22.00; grade 3, 21.25; grade 4, 20.75.

Brass Ingot: Red brass, No. 115, 35.00; tin bronze, No. 225, 46.00; No. 245, 41.50; high-leaded tin bronze, No. 305, 38.50; No. 1 yellow, No. 405, 27.50; manganese bronze, No. 421, 30.75.

Magnesium Alloy Ingot: AZ63A, 37.50; AZ91B, 37.50; AZ91C, 37.50; AZ92A, 37.50.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb; nominal 1.9% Be alloy). Strip, $1.86-$1.91, f.o.b. Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.88, f.o.b. Temple, Pa.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 30,000-lb lots, 41.355; l.c.l., 41.98. Weatherproof, 30,000-lb lots, 40.78; l.c.l., 41.53. Magnet wire deld., 15,000 lb or more, 48.68; l.c.l., 49.43.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh) Sheets, full rolls, 140 sq ft or more, $21.50 per cwt; pipe, full coils, $21.50 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill) Sheet and strip, $11.00-$14.75; sheared mill plate, $9.25-$11.25; wire $8.50-$11.00; forging billets, $6.85-$7.10; hot-rolled and forged bars, $7.10-$7.35.

ZINC

(Prices per lb, c.l., f.o.b. mill) Sheets, 24.00; ribbon zinc in coils, 21.50; plates, 20.00.

ZIRCONIUM

Plate, $20.35; H.R. strip, $23.95; C.R. strip, $32.00; forged or H.R. bars, $18.40; wire, 0.015 in., 8.00c per linear foot.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	126	106	128
Strip, C.R.	124	108	138
Plate, H.R.	120	105	121
Rod, Shapes, H.R.	107	89	109
Seamless Tubes	157	129	200

ALUMINUM

Sheet and Circles: 1100 and 3003 mill finish (30,000 lb base; freight allowed)

Thickness Range, Inches	Flat Sheet	Coiled Sheet
0.249-0.136	40.90-45.40	....
0.135-0.096	41.40-46.50	37.70-39.60
0.095-0.077	42.10-48.30	37.80-39.80
0.076-0.061	42.70-50.60	38.20-40.50
0.060-0.048	43.40-52.90	38.80-41.50
0.047-0.038	43.90-55.60	38.60-42.90
0.037-0.030	44.30-50.00	40.40-44.70
0.029-0.024	44.90-52.40	41.00
0.023-0.019	45.80-52.20	42.00
0.018-0.017	46.60-53.30	42.60
0.016-0.015	47.50-53.90	43.40
0.014	48.50-50.90	44.40
0.013-0.012	49.70-52.10	45.10
0.011	50.70-53.70	46.30
0.010-0.0095	52.10-54.40	47.60
0.009-0.0085	53.40	49.10
0.008-0.0075	55.00	50.03
0.007	56.50	51.80
0.006	58.10	53.20

ALUMINUM (continued)

Plates and Circles: Thickness 0.250-3 in., 24-60 in. width or diam, 72-240 in. lengths.

Alloy	Plate Base	Circle Base
1100-F, 3003-F	40.2	44.5
5050-F	41.3	45.6
3004-F	42.3	47.5
5052-F	42.9	48.2
6061-T6	44.4	50.0
2024-T4*	48.1	54.4
7075-T6*	56.4	62.5

*24-48 in. widths or diam, 72-180 lengths.

Screw Machine Stock: 30,000 lb base.

Diam.(in.)or across flats	Round 2011-T3	Round 2017-T4	Hexagonal 2011-T3	Hexagonal 2017-T4
Drawn				
0.125	74.30	71.50	....	....
0.156-0.172	63.00	60.40	....	....
0.188	63.00	60.40	....	76.40
0.219-0.234	59.70	57.20	....	....
0.250-0.281	59.70	57.20	....	73.00
0.313	59.70	57.20	....	69.60
0.344	58.50	....	....	....
Cold-finished				
0.375-0.547	58.80	57.50	70.10	65.50
0.563-0.688	58.80	57.50	66.70	61.60
0.750-1.000	57.40	56.00	61.00	58.10
1.063	57.40	56.00	....	56.10
1.125-1.500	55.20	53.90	59.00	56.10
Rolled				
1.563	53.70	52.40	....	....
1.625-2.000	53.10	51.60	....	....
2.125-2.500	51.70	50.30	....	....
2.563-3.375	50.20	48.70	....	....

Forging Stock: Round, Class 1, 43.30-55.90 in specific lengths 36-144 in., diameters 0.375-8 in. Rectangles and squares, Class 1, 48.10-63.20 in random lengths, 0.375-4 in. thick width 0.750-10 in.

Pipe: ASA schedule 40, alloy 6063-T6, standard lengths, plain ends, 90,000-lb base, per 100 ft.

Nom. Pipe Size(in.)		Nom. Pipe Size(in.)	
⅜	$18.45	2	$ 57.00
1	29.00	4	157.20
1¼	39.25	6	281.65
1½	46.95	8	423.80

Extruded Solid Shapes:

Factor	Alloy 6063-T5	Alloy 6062-T6
9-11	45.90-47.50	61.50-65.80
12-14	46.20-47.70	62.20-66.80
15-17	46.40-48.30	63.50-68.50
18-20	47.00-48.80	65.50-71.10

MAGNESIUM

Sheet and Plate: AZ31B standard grade, 0.32 in., 103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.0 in., 67.90. AZ31B spec. grade, .032 in., 171.30; .081 in., 108.70; .125 in., 98.10; .188 in., 95.70; .250-2.0, 93.30. Thread plate, .188 in., 71.70; .250-2.0 in., 70.60; Tooling plate, .250-3.0 in., 73.00.

Extruded Solid Shapes:

Factor	Com. Grade (AZ31C)	Spec. Grade (AZ31B)
6-8	69.60-72.40	84.60-87.40
12-14	70.70-73.00	85.70-88.00
24-26	75.60-76.30	90.60-91.30
36-38	89.20-90.30	104.20-105.30

NONFERROUS SCRAP

DEALER'S BUYING PRICES

(Cents per pound, New York, in ton lots)

Aluminum: 1100 clippings, 13.00-13.50; old sheets, 8.00-8.50; borings and turnings, 6.00-

BRASS MILL PRICES

	MILL PRODUCTS a				SCRAP ALLOWANCES f		
	Sheet, Strip, Plate	Rod	Wire	Seamless Tube	Clean Heavy	Rod Ends	Clean Turnings
Copper	58.13b	55.36c	....	58.32	32.000	32.000	31.250
Yellow Brass	50.19	40.17d	50.73	53.10	24.625	24.375	22.625
Low Brass, 80%	53.40	52.34	53.94	56.21	27.375	27.125	26.625
Red Brass, 85%	54.54	54.48	55.08	57.35	28.500	28.250	27.750
Com. Bronze, 90%	56.23	56.17	56.77	58.79	29.500	29.250	28.750
Manganese Bronze	57.88	51.98	62.23	....	23.000	22.750	22.250
Muntz Metal	52.19	48.00	....	....	23.125	22.875	22.375
Naval Brass	54.14	48.45	61.20	57.55	23.000	22.750	22.250
Silicon Bronze	62.44	61.63	62.48	64.61	31.250	31.000	30.250
Nickel Silver, 10%	66.66	68.99g	68.99	....	30.875	30.675	15.438
Phos. Bronze, A 5%	77.25	77.75	77.75	79.18	33.000	32.750	31.750

a. Cents per lb, f.o.b. mill; freight allowed on 500 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. 3% silicon. f. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time, of any or all kinds of scrap, add 1 cent per lb. g. Leaded

6.50; crankcases, 8.00-8.50; industrial castings, 8.00-8.50.

Copper and Brass: No. 1 heavy copper and wire, 26.50-27.00; No. 2 heavy copper and wire, 25.00-25.50; light copper, 22.50-23.00; No. 1 composition red brass, 24.00-24.50; No. 1 composition turnings, 23.00-23.50; yellow brass turnings, 14.00-14.50; new brass clippings, 21.00-21.50; light brass, 14.50-15.00; heavy yellow brass, 16.00-16.50; new brass rod ends, 18.50-19.00; auto radiators, unsweated, 17.50-18.00; cocks and faucets, 18.50-19.00; brass pipe, 19.00-19.50.

Lead: Heavy, 12.50-13.00; battery plates, 6.50-7.00; linotype and stereotype, 13.00-14.00; electrotype, 12.50-13.00; mixed babbitt, 13.00-14.50.

Monel: Clippings, 75.00-80.00; old sheets, 70.00-80.00; turnings, 60.00-75.00; rods, 75.00-90.00.

Nickel: Sheets and clips, 140.00-185.00; rolled anodes, 125.00-185.00; turnings, 125.00-160.00; rod ends, 140.00-185.00.

Zinc: Old zinc, 4.50-5.00; new die-cast scrap, 4.00-4.50; old die-cast scrap, 2.50-3.00.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)

Aluminum: 1100 clippings, 17.00-17.50; 3003 clippings, 17.00-17.50; 6151 clippings, 17.00-17.50; 5052 clippings, 17.00; 2014 clippings, 16.00-17.00; 2017 clippings, 16.00-17.00; 2024 clippings, 16.00-17.00; mixed clippings, 16.00-16.50; old sheets, 14.00-14.75; old cast, 14.00-14.75; clean old cable (free of steel), 16.50-17.00; borings and turnings, 14.25-15.00.

Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 58.00; light scrap, 54.00; turnings and borings, 38.00.

Copper and Brass: No. 1 heavy copper and wire, 29.00; No. 2 heavy copper and wire, 27.50; light copper, 25.25; refinery brass (60% copper) per dry copper content, 25.75.

INGOTMAKERS' BUYING PRICES

(Cents per pound, carlots, delivered)

Copper and Brass: No. 1 heavy copper and wire, 29.00; No. 2 heavy copper and wire 27.50; light copper, 25.25; No. 1 composition borings, 25.50; No. 1 composition solids, 26.00; heavy yellow brass solids, 17.50; yellow brass turnings, 16.50; radiators, 20.00.

PLATING MATERIAL

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.70 per lb.

Copper: Flat-rolled, 54.79; oval, 53.92, 5000-10,000 lb; electrodeposited, 45.78; 2000-5000 lb lots; cast, 48.04, 5000-10,000 lb quantities.

Nickel: Depolarized, less than 100 lb, $1.015; 100-499 lb, 99.50; 500-4999 lb, 95.50; 5000-29,999 lb, 93.50; 30,000 lb, 91.50. Carbonized, deduct 3 cents a lb.

Tin: Bar or slab; less than 200 lb, 121.50; 200-499 lb, 120.00; 500-999 lb, 119.50; 1000 lb or more, 119.00.

Zinc: Balls, 21.00; flat tops, 21.00; flats, 22.75; ovals, 22.00, ton lots.

CHEMICALS

Cadmium Oxide: $1.70 per lb, in 100-lb drums.

Chromic Acid: Less than 10,000 lb, 30.25, over 10,000 lb, 29.50.

Copper Cyanide: 100-1000 lb, 80.50.

Copper Sulphate: 500-1900 lb, 21.15; 2000 lb and over, 18.65.

Nickel Chloride: 10 lb, 46.50; 200 lb, 44.50; 300 lb, 43.50; 400-4900 lb, 41.50; 5000-9900 lb, 39.50; 10,000 lb and over, 38.50. Prices eastern delivery.

Nickel Sulphate: 100 lb, 38.25; 200 lb, 36.25; 300 lb, 35.25; 400-4900 lb, 33.25; 5000-35,900 lb, 31.25; 36,000 lb, 30.35. Prices eastern delivery.

Sodium Cyanide: Egg, under 1000 lb, 19.80; 1000-19,900 lb, 18.80; 20,000 lb and over, 17.80; granular, add 1-cent premium to above.

Sodium Stannate: Less than 100 lb, 80.10; 100-600 lb, 70.70; 700-1900 lb, 68.00; 2000-9900 lb, 66.10; 10,000 lb or more, 64.80.

Stannous Chloride (anhydrous): Less than 25 lb, 170.20; 25 lb, 135.20; 100 lb, 120.20; 400 lb, 117.70; 5200-19,600 lb, 105.50; 20,000 lb or more, 93.30.

Stannous Sulphate: Less than 50 lb, 132.70; 50 lb, 102.70; 100-1900 lb, 100.70; 2000 lb or more, 98.70.

Zinc Cyanide: Under 1000 lb, 55.55; 1000 lb and over, 53.55.

(*Concluded from page* 149)

$6 to $8 a ton—more for some work.

The U.S. Steel Corp., and its operating divisions, Columbia-Geneva Steel, and Tennessee Coal & Iron, increased extras on carbon and low-alloy high strength structural shapes, effective Jan. 16. The increase, similar to that put into effect by other producers over the last couple weeks, amounts to about 4.5 per cent.

Rails, Cars . . .

Track Material Prices, Page 140

Freight car awards dropped sharply in 1956 from those of the preceding year, report the American Railway Car Institute and the Association of American Railways. Orders totaled 41,223 cars, against 169,872 in 1955. Bookings, however, were substantially better than they were in 1954, when only 23,324 cars were placed.

December bookings were 4992 cars, against 4172 in November, and 42,278 in December, 1955.

Deliveries last year amounted to 67,080 cars, compared with 36,896 in 1955, and 35,558 in 1954. December deliveries totaled 7260 units, highest since October, 1953, when 8727 were delivered. The December total compares with 6695 in November, and 3796 in December, 1955.

Backlogs as of Jan. 1 were 117,257 cars, against 119,626 on Dec. 1, and 147,320 on Jan. 1, 1956.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

7200 tons, Penn-Lincoln Parkway Point interchange, LR 766, Section 3-D, Allegheny county, Pa., to the American Bridge Division, U.S. Steel Corp., Pittsburgh.

5200 tons, Penn-Lincoln Parkway, downtown Pittsburgh interchange, Allegheny county, Pa., to Ft. Pitt Bridge Works, Pittsburgh.

950 tons, state bridges, York county, Pa., to Bethlehem Steel Co., Bethlehem, Pa.

940 tons, plant building, Allen Mfg. Co., Bloomfield, Conn., to Sherry & Gordon Inc., The Bronx, New York; Walter Kidde Constructors Inc., New York, general contractor.

650 tons, bridges, LA 127, Section 1-A, and 350 tons for work LR 127, Section 1-B.

575 tons, high school, Hagerstown, Md., to Maryland Machinery Co., Hagerstown; J. D. Hedin Construction Co., Washington; 55 tons, reinforcing bars, Brocker Mfg. Co., York, Pa.

520 tons, building, Museum of Science, Boston, to the A. O. Wilson Structural Co., Cambridge, Mass., through Tredennick & Billings Co., Boston, general contractor.

420 tons, office building, Berkshire Life Insurance Co., Pittsfield, Mass., to the Haarmann Steel Co., Willimansett, Mass.

370 tons, high school, Storrs, Conn., to Haarmann Steel Co., Willimansett, Mass.; Anderson-Fair Oaks Construction Co., Hartford, Conn., general contractor; reinforcing bars,

FOR SALE OR LEASE
TOLEDO NO. 400 ¼ E SHEAR
CUTS ½" STEEL x 100"
FOX BROS.
3501 SOUTH FIRST STREET
ST. LOUIS 18, MISSOURI

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Multi-Million dollar expansion of our operating facilities has created opportunities in industrial engineering for young men trained or experienced in wage incentive programming, methods engineering, and statistical quality control.

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Send complete resume to Employment Manager

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P. O. Box 217
Fontana, California

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Progressive Midwest fabricator has an opening for high caliber man with broad experience in supervising the production of a structural plant. Firm has AAA rating, and has been in business for over 100 years. Salary five figures and up. Inexperienced men need not apply.

Reply Box 508, STEEL
Penton Bldg. Cleveland 13, Ohio

METALLOGRAPHER

Young graduate metallurgist with at least one to two years experience in industry. Non-ferrous experience desirable but not absolutely essential. We are willing to train to some extent, provided the applicant possesses the necessary qualifications. This position offers an outstanding opportunity for advancement and growth with an expanding organization. In reply please furnish full particulars regarding background and experience. State salary requirements. Direct reply to:

Employment Supervisor
KAISER ALUMINUM & CHEMICAL CORPORATION
Trentwood Works
Spokane 69, Washington

CLASSIFIED RATES

All classifications other than "Positions Wanted" set solid, 50 words or less $15.00, each additional word .30, all capitals, 50 words or less $19.20, each additional word .38; all capitals leaded, 50 words or less $23.40, each additional word .47. "Positions Wanted" set solid, 25 words or less $3.60, each additional word .14; all capitals, 25 words or less $4.50, each additional word .18; all capital leaded, 25 words or less $5.40, each additional word .22. Keyed address takes seven words. Cash with order necessary on "Positions Wanted" advertisements. Replies forwarded without charge. Displayed classified rates on request. Address your copy and instructions to STEEL, Penton Building, Cleveland 13, Ohio.

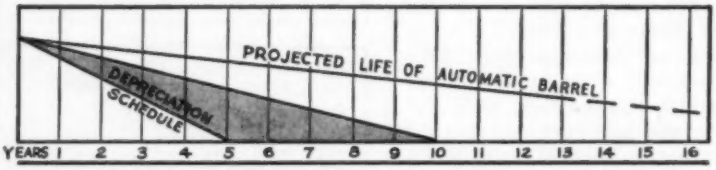
A HOT IDEA FOR COOL PROFITS

THE FINISHING TOUCH

by A. B. HOEFER
Vice-President
FREDERIC B. STEVENS, INC.

Stevens Automatic Plating Barrels Adaptable to Any Situation

IT'S GOOD TO KNOW WHEN YOU ARE INVESTING in a plating machine that Stevens units can be designed so that more than one type of plating can be done on one machine. Also, that changes can be made in the future to meet any specifications you may have. We've changed over a good number of Stevens machines in our time. That's why there are so many Stevens machines in use far beyond their depreciation schedule.



THERE ARE MANY OTHER SAVINGS you can enjoy beyond long life. Stevens Automatic Barrel machines require only one employee to operate the machine. These units are completely automatic, because the open end barrel is loaded when in a vertical mouth-upward position and automatically unloaded by tilting the barrel downward. There are no lids to fasten or unfasten.

POSSIBLE MIXING OF PARTS IS ELIMINATED in the Stevens automatic barrel. Small, special loads can be conveniently run without penalizing the productive capacity of the machine and without the inconvenience of partitioned cylinders. Stevens Automatic Barrel Machines are used for varied processes that include copper strike; copper, nickel, tin, brass, zinc and cadmium plating; phosphating; alrocing; dichromating; cleaning and bright dipping.

THE SIMPLE COMPACT DESIGN of this machine permits production capacities as high as 4,000 pounds per hour. Simplicity of design makes it equally practical to distribute the capacity between two or more machines to provide flexibility in plating thicknesses and production.

Let us give you more details on Stevens Automatic Barrels. Write us today,. Frederic B. Stevens, Inc., 1814 Eighteenth Street, Detroit 16, Michigan.

FREDERIC B. STEVENS
INCORPORATED
YOUR METAL FINISHING SUPERMARKET
DETROIT 16, MICHIGAN

METAL FINISHING EQUIPMENT AND SUPPLIES FROM CASTINGS OR STAMPINGS TO FINISHED PRODUCT

BRANCHES:
Buffalo • Indianapolis • New Haven
Offices in Principal Cities

Scherer Steel Co., Hartford.

325 tons, structurals and bars, high school, Meriden, Conn., to City Iron Works, Hartford, Conn. (structurals) and Scherer Steel Co., East Hartford (bars); Wadhams & May Co., Hartford, Conn., general contractor.

300 tons, structurals and bars, occupational therapy building, state hospital, Newtown, Conn., to New England Iron Works Inc., Hamden, Conn. (structurals) and Fox Steel Co., Orange, Conn. (bars); F. Franchini & Co. Inc., Derby, Conn., is general contractor.

200 tons, building, University of Massachusetts, Amherst, Mass., to Haarmann Steel Co., Williamsett, Mass.; M. J. Kelliher Co., Boston, general contractor.

200 tons, boiler house, E. J. Lavino & Co., Sheridan, Pa., to the Robinson Steel Co., Philadelphia.

160 tons, plant and office building, Soundscriber Corp., New Haven, Conn., to Haarmann Steel Co., Williamsett, Mass.; Ernest F. Carlson Inc., Springfield, Mass., general contractor; 60 tons, steel joists, H. Lawrence Foster Co. Inc., West Springfield, Mass.

STRUCTURAL STEEL PENDING

2000 tons, plant building, Sikorsky Division, United Aircraft Corp., Stratford, Conn.

1985 tons, five-span welded girder bridge, Framington river, and four composite rolled beam bridges, Hartford-Springfield expressway, Windsor-Windsor Locks, Conn.

1700 tons, Embreville State Hospital, Chester county, Pa.; bids Jan. 30.

1225 tons, five infirmary buildings and kitchen, Willowbrook State School, Staten Island, N.Y.; H.R.H. Construction Co., New York, low on general contract.

825 tons, railroad bridge, third phase of Eagle Gorge project, near Seattle; Paul Jarvis Inc., Seattle, low at $985,716 to the U.S. Engineer.

760 tons, 7-story addition to Seattle city light headquarters; Pacific Car & Foundry Co., Seattle, is low at $427,726.

560 tons, miter gate leaves, Robinson Bay and Graas river locks, St. Lawrence Seaway; bids Mar. 6, Corps of Engineers, Buffalo.

500 tons, Adak, Alaska, hangar; bids in Jan. 22.

400 tons, six-span composite beam bridge, Quinebaug river, Brooklyn-Plainfield, Conn.; bids Feb. 4, Hartford, Conn.

300 tons, Duwamish river pedestrian bridge, Seattle; bids to Boeing Airplane Co., Feb. 14.

PLATES . . .

PLATES PLACED

500 tons or more, storage tanks, Shell Oil Co., refinery, Anacortes, Wash., to Chicago Bridge & Iron Co., Seattle.

PLATES PENDING

5700 tons, sheet steel piling, Ice Harbor dam; bids in Jan. 15 to U.S. Engineer, Walla Walla, Wash.

RAILS, CARS . . .

LOCOMOTIVES PLACED

Belt Line of Chicago, one 900-hp diesel-electric switching unit, to Alco Products Inc., New York.

LOCOMOTIVES PENDING

New Zealand, 18 diesel-electric switching engines; bids closed Mar. 27. Specifications available through New Zealand Government Trade Commission, 1145 Nineteenth St., Washington, D.C.

RAILROAD CARS PLACED

Chicago & Eastern Illinois, 300 seventy-ton hopper cars, to the Johnstown, Pa. works of the Bethlehem Steel Co., Bethlehem, Pa.

Hudson & Manhattan-Pennsylvania, 50 air conditioned passenger cars, to the St. Louis Car Co., St. Louis.

Macon, Dublin & Savannah, 50 seventy-ton covered hopper cars, to ACF Industries Inc., New York.

Seaboard Airline, 12 special fifty-ton flatcars, to the Greenville Steel Car Co., Greenville, Pa.

Pennsylvania, six new type passenger coaches, to the Budd Co., Philadelphia.

Advertising Index

Ajax Engineering Corporation 39
Ajax Flexible Coupling Co., Inc. 148
Alco Products, Inc. 147
Allegheny Ludlum Steel Corporation 20
American Brass Co., The 116
American Chain & Cable 158
American Zinc, Lead & Smelting Co. 153
Armstrong-Blum Mfg. Co. 53
Associated Spring Corporation 13
Atlantic Refining Co., The 42
"Automatic" Sprinkler Corporation of America 8
Avondale Marine Ways, Inc. 85

Barber-Colman Co. 34, 35
Barnes-Gibson-Raymond, Division of Associated Spring Corporation 13
Barnes, Wallace, Co., Division of Associated Spring Corporation 13
Barnes, Wallace, Co., The, Ltd., Division of Associated Spring Corporation 13
Barnes, Wallace, Steel Division, Associated Spring Corporation 13
Barry Controls, Inc. 103
Behr-Manning Co., A Division of Norton Co. 21
Besly-Welles Corporation 45
Bethlehem Steel Co. 1
Bigelow-Liptak Corporation 121

Carpenter Steel Co., The, Alloy Tube Division 102
Cincinnati Cleaning & Finishing Machinery Co., Inc. 6
Cincinnati Milling Machine Co., The, Cincinnati Milling Products Division 33
Cincinnati Milling Machine Co., The, Process Machinery Division 65
Cincinnati Shaper Co., The 9
Clark Equipment Co., Ross Carrier Division .. 129
Climax Molybdenum Co. 49
Colorado Fuel & Iron Corporation, The .. 38, 126
Columbia-Geneva Steel Division, United States Steel Corporation 25
Cowles Tool Co. 115
Crucible Steel Company of America 32

DeVilbiss Co., The 122
DoAll Co., The 130
Dow Chemical Co., The 86
Dunbar Brothers Co., Division of Associated Spring Corporation 13

Eastern Machine Screw Corporation, The 148
Easton Car & Construction Co. 115
Electro Metallurgical Co., A Division of Union Carbide & Carbon Corporation 83
Erie Bolt & Nut Co. 120
Exide Industrial Division, The Electric Storage Battery Co. 22

Federal Machine & Welder Co., The 48
Federal Tool & Manufacturing Co. 117
Foote Mineral Co. 134

Gardner-Denver Co. 114
General Electric Co., Metallurgical Products Department 36, 37
Gibson, William D., Co., The, Division of Associated Spring Corporation 13
Gisholt Machine Co. 18, 19
Goodrich, B. F., Industrial Products Co. 7
Gould-National Batteries, Inc. 4
Great Lakes Carbon Corporation, Electrode Division 104

Hallden Machine Co., The 66
Haynes Stellite Co., A Division of Union Carbide & Carbon Corporation 44
Heald Machine Co., The ..... Inside Front Cover
Hooker Electrochemical Co. 142

Illinois Gear & Machine Co. 70
Inland Steel Co. 56
International Nickel Co., Inc., The 54

Jessop Steel Co. 141

Kaiser Aluminum & Chemical Sales, Inc., Kaiser Chemicals Division 46, 47
Kaiser Steel Corporation 155
Kearney & Trecker Corporation 132, 133
Keystone Steel & Wire Co. 123
Kidde, Walter, & Co., Inc. 10
Kingsbury Machine Tool Corporation 16

La Salle Steel Co. 2
Lenco, Inc. 157
Link-Belt Co. 11
Lodge & Shipley Co., The 136
Lurie Brothers & Co., Inc. 151
Lynchburg Foundry Co. 88

Manross, F. N., & Sons Co., Division of Associated Spring Corporation 13
Marchant, Geo. F., Co. 149
Master Electric Co., The 101
Mesta Machine Co. 99
Metallurgical Products Department of General Electric Co. 36, 37
Michigan Steel Tube Products Co. 23
Milwaukee Division of Associated Spring Corporation 13
Mullite Works, Laclede-Christy Division, H. K. Porter Company, Inc. 131

Norton Co., Behr-Manning Co. Division 21
NRC Equipment Corporation 17

Ohio Division of Associated Spring Corporation 13
Osborn Manufacturing Co., The 3

Pioneer Engineering & Manufacturing Co., Inc. 12
Pittsburgh Steel Co., Pittsburgh Steel Products Division 40, 41
Pivot Punch & Die Corporation 128
Porter, H. K., Company, Inc., Mullite Works, Laclede-Christy Division 131
Progressive Mfg. Co., The, Division of The Torrington Co. 124

Ransburg Electro-Coating Corporation 110
Raymond Manufacturing Co., Division of Associated Spring Corporation 13
Republic Steel Corporation 118, 119
Rockford Machine Tool Co. 14, 15
Rockwell Manufacturing Co. 81
Roebling's, John A., Sons Corporation, A Subsidiary of The Colorado Fuel & Iron Corporation 38
Ross Carrier Division, Clark Equipment Co. .. 129
Russell, Burdsall & Ward Bolt & Nut Co. 74
Ryerson, Joseph T., & Son, Inc. 50

Seaboard Pacific Division, Associated Spring Corporation 13
Selas Corporation of America 78
Sewall, E. B., Manufacturing Co. 97
Somers Brass Co., Inc. 77
Standard Oil Co. (Indiana) 30, 31
Stevens, Frederic B., Inc. 156

Teiner, Roland, Co., Inc. 76
Tennessee Coal & Iron Division, United States Steel Corporation 25
Timken Roller Bearing Co., The ..... Back Cover
Torrington Co., The, The Progressive Mfg. Co. Division 124

Union Carbide & Carbon Corporation, Haynes Stellite Co. 44
Union Carbide & Carbon Corporation, Electro Metallurgical Co. 83
Union Wire Rope Corporation 29
United Engineering & Foundry Co. 113
United States Rubber Co., Mechanical Goods Division 73
United States Steel Corporation, Subsidiaries 25, 26, 27, 28
United States Steel Export Co. 25
United States Steel Supply Division, United States Steel Corporation 25
Universal Atlas Cement Co. 28

Vanadium-Alloys Steel Co. 109

Ward Steel Co. 157
Wean Equipment Corporation 43
Wheelabrator Corporation 24
Wickwire Spencer Steel Division of The Colorado Fuel & Iron Corporation 126
Wilson, Lee, Engineering Co., Inc. ..... Inside Back Cover

~ ~ ~

Table of Contents, Page 5

Classified Advertising, Page 155

For Years

HI-AMP®

has been FIRST with every important advancement made in

ELECTRODE HOLDERS

—no wonder then, that thousands of actual users have switched to HI-AMP—they quickly discovered, through experience, that you can't beat a HI-AMP Electrode Holder, regardless of model, when it comes right down to practicability, performance and economy in maintenance.

When are you going to switch? Just ask any Welding Supply Dealer anywhere for PROOF of the above statement.

LENCO, INC.

(Formerly Wagner Mfg. Co. Inc.

JACKSON, MISSOURI

Weld with HI-AMP

WARD STEEL CO.

We specialize in
FINISHED STEEL
BARS—TUBES—STRIP

PROMPT WAREHOUSE SERVICE ONLY

Most Complete Stock in America of
BLUE TEMPERED SPRING STEEL

We believe that the way to sell is to carry a stock which permits satisfying any reasonable warehouse demand.

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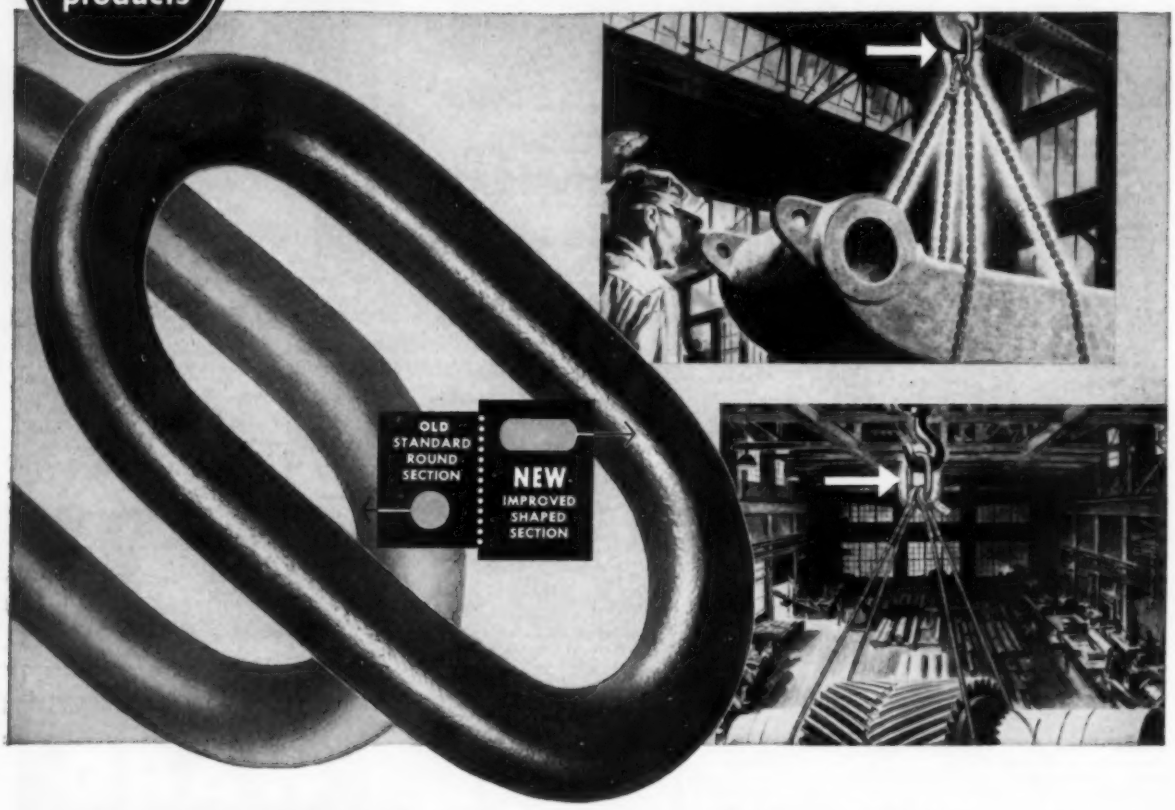
Phone: Grovehill 6-2600

ACCO products

ACCO Registered* Slings–Wire Rope & Chain

THE STANDARD OF EFFICIENCY AND SAFETY



New Master Link for Slings—Either Chain or Wire Rope—Holds Its Form Under Loads Up to 18% Greater

• Latest product of the continuing research behind ACCO *Registered* Slings is this new Shaped Section Master Link. ACCO's engineers found that by shaping the link—as shown above—they could give it more "dimensional stability"—a better "section modulus." Translated into layman's English this means that the new shaped link, without any increase in weight, will withstand deformation under loads up to 18% greater than a standard round section link will.

Just as shaping a quantity of metal into a structural I-Beam allows it to handle greater loads than it could as a solid beam, so does ACCO's Shaped Section Master Link give better performance under greater loads than a link with a round section.

The new shaped link is smoother and provides a greater factor of safety. It is a better and safer link. It costs us more to make. But it will be offered on all ACCO *Registered* Slings—both wire rope and chain—at no increase in price.

AN EXTRA BONUS OF SAFETY

This latest technological advance adds an extra bonus of safety to ACCO *Registered* Slings.

Each component of an ACCO *Registered* Sling is made from the best materials procurable for its use. Each part must prove to have strength equal to or greater than the sling body. All hooks for ACCO *Registered* Slings are Magnaflux tested. Then these components are assembled into slings according to carefully engineered designs that have proved themselves in rigorous field tests.

The completed sling is then individually proof-tested to twice the working load limit. Then and only then, is it awarded the coveted ACCO Registration Certificate and the identifying ring or tag.

SEE YOUR DISTRIBUTOR

ACCO *Registered* Slings are readily available from a distributor near you. If you don't know him write to our Bridgeport office for his name.

*Trade Mark Registered

ACCO

AMERICAN CHAIN & CABLE

BRIDGEPORT, CONN.

Atlanta, Boston, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Odessa, Tex., Philadelphia, Pittsburgh, Portland, Ore., San Francisco, Wilkes-Barre, Pa., York, Pa.
In Canada: Dominion Chain Co., Ltd., Niagara Falls, Ont.

Better Value

Another large tonnage steel producer looks to single stack furnaces for better annealing

"Highly pleased," say operators of pilot installation of 6 Lee Wilson furnaces

The swing to Single Stack furnaces for big coil annealing is gathering momentum with each new order placed by leading steel producers.

A large Eastern mill was the latest to break a long standard multiple-stack precedent by purchasing a pilot installation of Lee Wilson Single Stack furnaces for purposes of comparative testing.

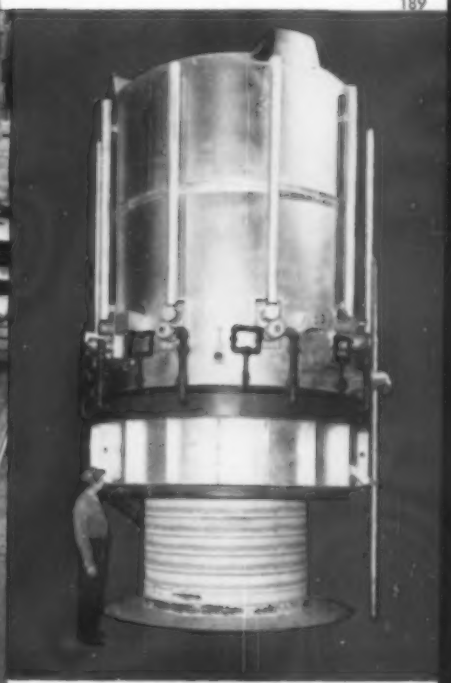
Early results indicate that the Single Stacks easily outproduce the older style furnaces per base and per man. What's more, the quality of the steel has never been better. "Highly pleased," say operators of the pilot installation.

If you don't already have the facts on this modern method of annealing, let Lee Wilson engineers put you in touch with those who have operated both types.

Lee Wilson*
ENGINEERING COMPANY, INC.
20005 WEST LAKE ROAD CLEVELAND 16, OHIO

* ORIGINATORS AND LEADING PRODUCERS OF SINGLE STACK RADIANT TUBE FURNACES

189



The photograph (left) shows a general view of the pilot installation consisting of 6 furnaces and 15 bases. Above is a close-up of one of the furnaces being lifted from a charge.

Speeds materials handling 30% to 40%

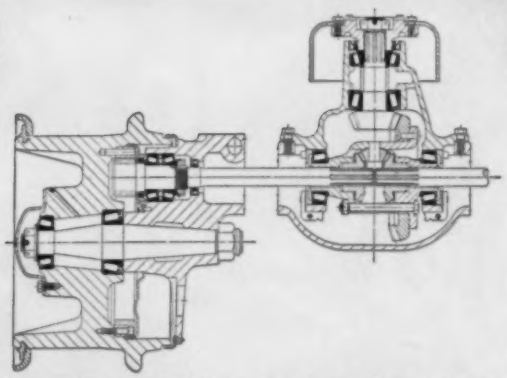
...on TIMKEN® bearings

THIS Towmotor Model 460, known as "The One-Man Gang" in the automotive industry where every minute counts in meeting tight production schedules, cuts materials handling time up to 40%. And Timken® tapered roller bearings "roll the load" in steering kingpin, steering wheel, drive wheel, jack shaft, differential gear shaft and pinion—keep the Model 460 on the go.

Highly maneuverable, the Towmotor 460 must make countless starts and stops—putting heavy load on the pinion. Timken bearings keep the gears in accurate alignment despite these heavy changing loads. The tapered construction of Timken bearings lets them take radial and thrust loads in any combination. And full line contact between Timken bearing rollers and races gives them extra load-carrying capacity. No extra thrust devices are needed. Simpler, more trouble-free designs are possible.

Maintenance costs are reduced, with Timken bearings practically eliminating friction. Geometrically designed and precision-manufactured to give *true rolling motion*, Timken bearings meet rigid quality controls every step of the way. We even make our own steel, which no other American bearing maker does. Timken bearings make all kinds of machinery run better, last longer. Look for the trade-mark "Timken" on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.



TOWMOTOR CORPORATION mounts the drive axle of its Model 460 lift truck on Timken tapered roller bearings to speed materials handling.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS

ROLL THE LOAD